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The Role of the Internet in the Primary School Classroom: From a learning and teaching perspective

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Chapter One

Introduction

1.1 Introduction

This research explored how the Internet was used in a number of primary school classrooms in public schools in New South Wales. There has been significant government investment in information and communication technology (ICT) in education, both in Australia and overseas. In Australia, this has extended to all levels of government, including the New South Wales state government. In recent times, however, the New South Wales Department of Education and Training has been working to improve access by having a department intranet that provides all schools with broadband Internet access. Despite the continuing improvements to the ICT infrastructure available in schools, many teachers are not making the best possible use of the Internet with their classes (Robertson, Grady, Fluck, & Webb, 2006).

The study presented in this book focuses particularly on the use of the Internet and aimed to investigate teachers' and students' experiences of Internet-based activities in the classroom. Some researchers suggest few teachers appear to be significantly integrating the Internet and ICT into the learning activities they use within the classroom (Oberg & Gibson, 1999; Robertson et al., 2006). Other research is emerging that suggests that the Internet can be used effectively and for a range of purposes (Wallace, 2004). ICT provides tools to support interactive and conceptual learning using the Internet, and has the potential to transform learning (Curriculum Corporation, 2005) in an engaging way.

There has been increased investment in ICT by the New South Wales Department of Education and Training with programs in place to assist teachers with the integration of ICT into their class teaching (Early Childhood Primary and Rural Education Directorate, 2001). However, it appears teachers are still not consistently integrating technology into their classroom teaching (BECTA, 2004; Robertson, Fluck, Webb, & Loechel, 2004; Zhao & Frank, 2003). At the moment it is unclear as to why this is happening and there is a lack of current research, particularly research pertaining to the New South Wales public school system and in Australia.

1.2 Background to the Study

As ICT is increasingly available in society it is impacting on schools today, in part with the expectation that schools will use this technology to ready students for the future. It has now become important for schools to provide access, knowledge and skills to students as they are prepared for life in a modern society. In New South Wales public schools there has been increasing emphasis on the integration of ICT into the curriculum. This emphasis on integration includes student ICT skills and knowledge distributed across all key learning areas. This increasing emphasis is due in part to the New South Wales Government's *Computers in Schools Policy (CISP)*, which was instigated in 1995 with the specific goal to ensure student access to ICT, including having access to computers as

educational tools across all curriculum areas. To achieve increased integration of ICT in the classroom the government proposed connecting all public schools in the state to the Internet, providing professional development to teachers, installing extra computers in schools and developing curriculum support materials (McCullough, 1995). This policy was expanded in 1999 when the government released *Preparing for the Future: Labor's Computers in Schools Plan* which announced an expansion of the original policy with improved and expanded Internet access, and additional computers being placed in schools, and more extensive teacher professional development (McCullough, 1999).

The emphasis on using ICT in the classroom has continued in New South Wales, with the New South Wales Department of Education and Training developing a set of strategic directions for public schools. One of the goals presented in the paper *New South Wales Public Schools Strategic Directions 2002 – 2004* (New South Wales Department of Education and Training, 2002b) was to:

empower students to use information and communications technologies confidently, creatively and competently to enhance their own learning (p. 1).

This document argues that to achieve this goal the New South Wales Department of Education and Training would improve the ICT skills of teachers and “extend the use of new technology to support learning and teaching” (New South Wales Department of Education and Training, 2002b, p. 2). This commitment to student learning through the integration of ICT in the classroom was in response to *The Adelaide Declaration on National Goals for Schooling in the 21st Century* (MCEETYA, 1999). This expressed national goals for schooling in the future made by the State, Territory, and Commonwealth Ministers of Education, who form the Ministerial Council on Education, Employment, Training, and Youth Affairs (MCEETYA).

The Adelaide Declaration has led the New South Wales Department of Education and Training to implement several changes in relation to ICT implementation in schools. These changes include initiatives and subsequent assessment of student learning, such as computer skills testing for all students in their final year of primary school. The ‘New South Wales Teachers Federation’, the teacher’s union, requested its members to refuse to administer the tests in 2005 and 2006 due to implementation issues including a lack of working technology and technological support (Johnson, 2006, March 13).

1.3 Purpose and Rationale of the Study

Teachers are expected by the New South Wales Department of Education and Training to use ICT, including Internet related technology, in their teaching. However, evidence has been found that teachers encounter barriers to implementing this technology (BECTA, 2004; Cuban, Kirkpatrick, & Peck, 2001; Gibson & Oberg, 2004). The purpose of this study was to investigate how teachers were using the Internet in the classroom and overcoming these barriers.

This study explored issues in how teachers are addressing and overcoming problems with integrating Internet technology into their teaching and learning programs. It investigated the types of Internet activities implemented in class, and how these have been integrated into the whole class teaching and learning program. The study examined the learners' experience of the activities and the teachers' rationale for the use Internet resources. This study also focused on the barriers teachers were faced with when utilising the ICT available to them in their classroom teaching.

Computer related technology is increasingly used in society with students needing to have a variety of skills in this area (Isernhagen, 1999; Prensky, 2001). In New South Wales public schools, there is an increasing emphasis on integrating ICT skills and knowledge across all key learning areas in the curriculum. ICT integration can be defined as “the process of determining which electronic tools [or resources] and which methods for implementing them are appropriate for given classroom situations” (M. D. Robyler & Edwards, 2000, p. 8). This required that teachers modify their pedagogical practices to integrate the curriculum content of their teaching with new ICT skills students are required to learn. However, theoretical foundations, including pedagogies, appear to have not developed at the same pace as technological growth in the world (Hill, Wiley, Nelson, & Han, 2004).

It has been argued that teachers and students do not think about and use technology in the same way (Prensky, 2001). Prensky suggests that students of today “are no longer the people our educational system was designed to teach” (Prensky, 2001, p. 1). It is also argued by Prensky (2004), that teachers are ‘digital immigrants’ while the students they are teaching are ‘digital natives’. Prensky, (2004) suggests that today’s students are digital natives because they are living using new online methods, based on the new technologies they have available to them. These included technologies such as the Internet as well as developments such as Web2.0, MP3 and advanced mobile phone technology.

An important aspect of this study was to examine the barriers to pedagogical change. It has been argued that by using the technology and specifically Internet technology it can change the pedagogical approaches teachers use (Lankshear, Peters, & Knobel, 2000). Lankshear, Peters, and Knobel (2000) support this idea that the Internet can modify pedagogical approaches to school learning by arguing it has:

been based on the idea that by participating in curriculum subjects derived from the disciplines learners could come to see how this content gets discovered and justified by experts, in addition to learning [about] the content itself (p. 34).

A current argument used to encourage the use of ICT relates to another aspect of how Internet usage is affecting student learning. Grabe and Grabe (2007) suggest a cognitive perspective be used when teaching with technology, including Internet technology. This places an emphasis on how students solve problems and acquire information and skills as well as engage in academic tasks. Jonassen and Reeves (1996) further support the modifying influence of the Internet by suggesting computers should be used as cognitive tools. They suggest that cognitive tools actively engage learners who then develop critical thinking skills and that they learn more in the process of using these tools than when they are presented with information (Jonassen & Reeves, 1996).

The barriers to using ICT in the classroom are not unique to Australia and indeed are common to many developed nations (cf. Royer, 2002). The US National Center for Education Statistics reports that although a majority of teachers surveyed indicated they had received some training in using ICT only 20 percent felt “very well prepared to integrate educational technology into classroom instruction” (US Department of Education National Center for Education Statistics, 1999). In other research, Jones (2002), recommends that teachers have a good understanding of computer hardware and software in order to teach students using good pedagogical practices, thus ensuring they can integrate ICT into their class teaching. Bitner and Bitner (2002) support this by suggesting teachers need to learn to use ICT and then allow the technology to change

their teaching paradigm. Jones (2002) goes on to state that it is important to acknowledge the importance of ICT skills and train staff in these skills. Roschelle, Pea, Hoadley, Gordin and Means (2000) support this argument and suggest that these are important steps in working towards using appropriate pedagogies in using ICT, especially as improving education through the use of ICT is not easy as there are many ways this use can fail.

1.4 Statement of Research Questions

The main purpose of this study was to explore how teaching and learning activities can be enhanced in primary school classrooms through using the Internet. Thus, the over-arching research question for the study is:

How is the Internet used to enhance teaching and learning activities in the primary classroom?

Due to the complexity of this question the main research question was then broken down into the following sub-questions which each focused on one critical component of the main question:

1. How does the class teacher use the Internet to support teaching and learning in the primary classroom?

This question was concerned with how the class teacher used the Internet in the classroom, and more specifically how it is used to support teaching and learning. Although research has been conducted on using the Internet in the classroom, it appears not to have been conducted in the New South Wales public school context.

2. How do students use the Internet both in school and in their everyday lives?

This research was also concerned with how students used the Internet in school. This included both in the classroom and at other times when the students may have had Internet access such as in the library or after school. This sub-question also included how the Internet was used in students' everyday lives, such as at home or other places where they may access the Internet.

3. What impact does ICT availability have on the use of the Internet in the classroom?

This final sub-question related to the impact that available technology has on the use of the Internet in the classroom. Public schools in New South Wales vary in ICT infrastructure which means that the impact of this technology availability is different in every school.

1.5 Significance of the Study

The motivation for this study stems from the researcher's work in the New South Wales public school system during which time she observed teachers often struggling to use the Internet in their classrooms. Initially this study planned to investigate the implementation of 'e-learning accounts', which were to provide 1.2 million teachers and students in the New South Wales public school system with Internet access and email accounts from 2004. The proposed introduction of these accounts by the New South Wales state government raised questions about how Internet technologies could and should be integrated into school education. Concerns about the integration of the accounts led the

New South Wales Teachers' Federation (the teacher's union) to impose bans on their use. This situation posed serious challenges to the research as it had originally been envisaged, making it impossible to investigate the implementation of the e-learning accounts. However, by changing the focus of the study away from the specific initiative to investigate the more general topic of integration of the Internet into the classroom, the research was still able to be conducted. Thus, the researcher was able to investigate why it appeared that although many teachers have access to various technologies, and schools often have well developed ICT infrastructure, including Internet access in place (McCullough, 1995, 1999), teachers still may not be utilising this technology to its fullest extent in the classroom.

This study makes a contribution to knowledge about how primary school teachers are using the Internet to enhance teaching and learning within their classroom teaching and learning programs. Although there is a plethora of research on integrating and using ICT within the classroom (Boyle, 2005; Goodison, 2003; Isabelle & Lapointe, 2003; Lai, 2005; M. D. Robyler & Edwards, 2000; Tubin & Edri, 2004; Yuen, Law, & Wong, 2003), there is currently a dearth of research on the specific ways in which teachers are using the Internet in the classroom, and particularly in New South Wales public primary schools. This study adds to this research body and improves the understanding of how the Internet is integrated into classrooms.

Use of the Internet by teachers is growing at an exponential rate, in part because the Internet can support a student centred learning environment (Hill et al., 2004). In New South Wales, teachers are required to teach using the Internet as it is part of the strategic directions implementation (New South Wales Department of Education and Training, 2002b) and the curriculum (New South Wales Department of Education and Training, 2001). However, teachers often feel challenged when integrating ICT and the Internet into their class teaching and learning programs (Robertson et al., 2004). This study is therefore significant because it provides insights into how the Internet can be utilised in classroom practice.

It appears there is a lack of clear understanding of the impact Internet technology has had and the effect it is having on the processes of teaching and learning (Hill et al., 2004). Researchers and teachers are also currently questioning many learning theories and traditional educational practices "and their underlying epistemological assumptions, beliefs, [and] concepts" (Lankshear et al., 2000, p. 39). As a result little is understood about Internet supported pedagogies within a classroom setting. This study provides a better understanding of the pedagogical approaches being used by teachers to integrate the Internet into the classroom. This has wider implications for perceptions into how ICT supported pedagogy can be improved.

Although the study was situated in New South Wales, the challenges and issues reflect the situation in many primary schools throughout the world. This study is therefore both timely and significant to the New South Wales public school system, the Australian school systems as well as other western school systems.

1.6 The Research Design

This study adopted a predominately naturalistic paradigm within a case study approach. This case study methodology was used because it provided a holistic view of the classroom and focused on the process rather than an outcome, and on discovery (Burns,

2000). This was in order to gain an in-depth understanding of the inquiry. Five cases were explored, with each case representing one primary classroom.

Several instruments were used for data collection, including interviews of teachers and students, and questionnaires that were completed by the students. This data were collected at the beginning and end of a ten week school term. The students also completed an e-learning journal each week for the period of data collection.

After the data collection was completed the interviews were transcribed and all data were coded. Data were subsequently analysed in a computer software program called NVivo. Themes emerged from the data and these are then reported in Chapter 4.

A constructivist perspective has been used to inform this study as it emphasises the perspective of the individual and, as the research methodology applied must reflect this, qualitative methodology has been used. This is appropriate because “qualitative research places stress on the validity of multiple meaning structures and holistic analysis” (Burns, 2000, p. 11) and tends “to be based on a recognition of the importance of the subjective, experiential ‘lifeworld’ of human beings” (Burns, 2000, p. 11).

1.7 Definition of Terms

There are a number of terms used in this book. The reason for providing a definition for these terms is that the definitions in the literature are not consistent, as different authors use them with slightly different meanings. To clarify any potential misunderstandings or misconceptions, provided below are the terms and the definitions that will be used in this book.

Classroom	In this study the classroom is defined as the physical environment the class was located in. This included their everyday workspace as well as places such as computer mini laboratories, a small room, often at the back or side of the main classroom where students could retreat and access a small group of computers.
Computer	This is an electronic machine that operates under the control of instructions stored in its own memory. It can accept data, manipulate data, produce results and store these results for the future (Shelly, Cashman, Gunter, & Gunter, 2006).
e-learning journal	The journal the students were asked to keep in order to determine their Internet usage. An example of a journal can be found in Appendix A.
ICT	Information and Communication Technology
Instant Messaging	A computer software program that allows synchronous communication between different computer users over the Internet (Education and Training Committee, 2006).

Integration	The “process of bringing different parts together to combine into a whole” (Shelly et al., 2006, p. 571). For example, integration of curriculum content with skills needed to use a computer, or integrating different curriculum content areas or key learning area.
Internet	“Worldwide network of computer systems and networks that share information and data using a standard communication protocol (Internet Protocol)” (Education and Training Committee, 2006, p. 204).
Key Learning Area (KLA)	The different curriculum areas to be taught in New South Wales public schools. These include the Key Learning Areas of English, Mathematics, Human Society and its Environment, Physical Education, Health and PD, Science and Technology, and Creative Arts.
Release from Face to Face (RFF)	In New South Wales public schools, each classroom teacher is released from face to face teaching for two hours each school week. This time is generally for lesson preparation and marking. Another teacher takes the class at this time.
Student centred teaching	A teaching method that allows the students some autonomy to choose topics and resources used (Lai, 2005).
Technology	This was the term first used to describe computer use in schools (Shelly et al., 2006).

1.8 Structure of the Book

This first chapter has introduced and provided a rationale for the study. The research questions have also been presented. The next chapter will review the current literature as well as set the framework for the public school system in New South Wales, Australia, to show the gap in the literature the study addressed. The third chapter details the methods of data collection as well as describing the research design in detail and the qualitative approach used. The results of the data analysis are presented in the fourth chapter which also includes an initial discussion of each case and then compares them. The final chapter of this book presents the results in relation to the research questions, summarises the results, and presents recommendations for further research.

Chapter Two

Review of the Literature

2.1 Introduction

This literature review considers what is known about using the Internet to enhance teaching and learning in the classroom. In order to understand the context in which the study is situated this chapter will explore current research concerning how information and communication technology (ICT) is currently used in the classroom, and in particular the Internet and its integration into the classroom setting. It is important to make known the global, Australian and New South Wales contexts and their importance for this study. The literature is discussed with regard to applications of educational technology, including leadership of ICT implementation and teacher professional development, as well as barriers to using technology. Technology use in the classroom, including using the Internet in the classroom, is discussed, as is using the Internet to enhance student learning and information literacy. Finally, this chapter examines the literature on Internet uses, including using the Internet for email and information literacy and literature in relation to technology use at home, using the Internet and the digital divide.

2.2 Policy in Educational Technology

Policy is the driving force behind what is taught in schools and so it is important for this literature review to examine the various overarching policies influencing the use of ICT in education. Throughout western countries ICT in education has been prioritised in numerous countries through the development of policies and the allocation of funding ((Department of Education Science and Training, 1999; Labour Party, 1997; MCEETYA, 1999; US Department of Education, 2004). This chapter focuses on the global context of policies in educational technology before describing the Australian context and more specifically the New South Wales context. Predominately, the United States, the United Kingdom, and the Australian contexts have been examined, in part because the United States and United Kingdom contexts have at times been influential on the Australian context.

When examining ICT integration in a school setting it is important to note there are several important stakeholders, including the various teaching staff in the school, the students and the school administrators. Other stakeholders include parents and the wider community. Often these stakeholders work together in various ways to provide the infrastructure necessary to support effective ICT use in schools. The way they work together varies among schools both in the state of New South Wales, outside of the state and in countries other than Australia. The stakeholders are often constrained by the government in power and as governments change, so too can expectations and policies. According to Zhao and Frank (2003) there are many external social and political forces that need to be considered when schools introduce a new technology and as such the introduction of ICT into schools has, by and large, not been successful. This is true for schools in western countries including but not limited to the United States, the United Kingdom and Australia.

2.2.1 The Global Context

In 2001, the United States government announced the *No Child Left Behind Act* (US Department of Education, 2004) which prompted many changes in public education. Its main focus was on improving the standards of literacy and numeracy for all students in the United States based on four main principles:

- schools to be held accountable to demonstrate students are learning;
- allowing flexibility for schools to reach their goals;
- providing options for parents so they may choose to send their child to a school that is not low performing; and,
- using research on maximising student learning, meaning that new practices are reflected upon and refined to ensure student learning is maximised.

This act contains a subsection entitled 'Enhancing Education through Technology Act of 2001'. One of the provisions of the act was a long term evaluation of technology and its impact on teaching and learning. This has led to several researchers theorising about how to best research the impact of ICT on teaching and learning (M. Robyler, 2004; Terrell, 2002). Some results of Robyler's inquiry include using better research designs, building on a theoretical foundation and changing the kind of questions asked by using current knowledge to inform "development of appropriate ways to study these uses" (M. Robyler, 2004, p. 4).

The *No Child Left Behind Act* has been the catalyst for the development of new standards as schools have become more accountable for their teaching and learning practices (US Department of Education, 2004). One of these standards that relates closely to this study has been schools connecting to the Internet, with almost 100% of public schools having access to the Internet by 2003, and 93% of all classrooms having Internet access (Parsad & Jones, 2005). Parsad & Jones (2005) report that in 2003, 95% of these schools were using broadband, while 32% used wireless. These figures appear to be changing as time moves on.

Child safety in all forms is essential and with the availability of the Internet in schools, it is important to note, the United States government also introduced the *Children's Internet Protection Act* (CIPA) in 2001 to force schools to introduce a policy on Internet safety for their students. Due to this, 97% of schools with Internet access used either technologies or procedures to control student access to inappropriate sites. These included strategies such as blocking or filtering software, teachers monitoring student access, parents required to sign a contract, and a contract for students to sign (Parsad & Jones, 2005).

The situation in the United Kingdom with regard to ICT, including the use of the Internet in education, is vastly different from the United States context, in part due to a different political structure. When the Prime Minister Tony Blair came into power in 1997, he claimed that education was the number one priority of the government (Labour Party, 1997). Included in this policy was that access to computer technology was one of these priorities with the government creating a 'National Grid for Learning' which provided students access to high quality educational materials (Labour Party, 1997). Another area of priority was the notion of lifelong learning through which constituents were encouraged to take up training (Labour Party, 1997). As a result of this, there were changes in virtually every area of British education (Walford, 2005).

According to Selwyn (2002), the British government has invested billions of pounds in creating initiatives such as 'UK Online' with the establishment of a network of 6000 online centres. The National Grid for Learning included an investment of £700 million that was

aimed to connect all of Britain's 30,000 public schools to the Internet by 2002, while another £230 million was set aside as a 'New Opportunities Fund' which was to train teachers to use this new technology (Selwyn, 2002). Selwyn and Gorard (2003) suggest that to date there has largely not been a shift to lifelong learning, although the continuing education of the workforce is occurring.

The British Educational Communications and Technology Agency (BECTA) was established to support the United Kingdom's four education departments in their strategic use of ICT (BECTA, 2006). The education departments are the 'Department for Education and Skills', the 'Scottish Education and Employment Department', the 'Department of Education, Northern Ireland' and the 'Department of Education and Training in Wales'. The agency acts as a strategic advisor and coordinator of e-strategy, providing insight from analysis and research and working with partners for strategic delivery of the e-strategy (BECTA, 2006). Currently there is no equivalent body in the United States, although the US Department of Education does have an Office of Educational Technology (OET) which provides leadership in order to "maximise technology's contribution to improving education" (US Department of Education, 2004, p. 48).

Internet safety is also a pressing issue for Internet use in the United Kingdom. In 2002, BECTA commissioned research into Internet safety practices in schools with 577 schools being surveyed. It was found that 95% of schools had Internet filtering strategies in place, while 89% of schools had an Internet safety policy (BECTA, 2002). More recently, another study conducted in 444 schools found that schools which have an Internet safety coordinator as well as an acceptable use policy appear to equip teachers to better deal with breaches. Interestingly, this study found students in Years 6, 10 and 11 were most likely to breach the policy by accessing unsuitable sites (Barrow & Heywood-Everett, 2006).

In other parts of Europe, the European Commission implemented an e-Learning Action Plan. The Action Plan involved providing "all schools with access to the Internet and multimedia resources by the end of 2001, and to equip all classrooms with a fast Internet connection by the end of 2002" (Heller, 2001, p. 1). Also included in this plan were online support services and educational resources for teachers, parents and pupils. The German government took this further by introducing numerous initiatives (both public and private) to assist in advancing the use of technology in education by creating structural changes (Issing & Schaumburg, 2001).

As can be seen above, both the United States and the United Kingdom have taken different approaches to ensuring that educational technology or ICT is available in schools.

2.2.2 The Australian Context

Over the past few years the Australian government has also been attempting to prepare for the future of its citizens by ensuring that they are familiar with and have access to various types of technology. In 1999, a meeting of the Ministers of Education for each State, Territory and the Australian Federal Government committed to improving schooling in Australia and thus *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* was developed (Department of Education Science and Training, 1999). This declaration set current national goals for schooling in Australia, which have been agreed upon by every state and territory. Representatives from these states and territories then began working together on a national approach to Australia's future for information technology, the economy and society (Minister for Education Training and

Youth Affairs, 2000). An action plan for the 'information economy' stated that the public needed to be given the skills to drive this information economy. Infrastructure was to be developed, and online content was also to be created. It was also recognised that there was a need to develop policies and a framework to promote an information society, as well as regulatory frameworks for the creation of this infrastructure (Department of Education Training and Youth Affairs, 2000). From this action plan came the Quality Teacher Program and the innovative national bandwidth project, via which the government committed to ensuring improved broadband infrastructure throughout the country (National Office for the Information Economy, 2004). This bandwidth project, called the National Bandwidth Implementation Plan, was initiated to attempt to improve schools' access to the Internet, with an investment in infrastructure recognised as being important (Curriculum Corporation, 2003). By 2003, much of the action plan had been implemented and significant progress had been made with increased access to infrastructure, providing access to digital learning content and ensuring curriculum in all states specified outcomes relating to ICT all being reported (MCEETYA, 2003).

During the past few years, Australia has continued to develop both initiatives and goals for the implementation of information and communication technology strategies in education. The *National Report on School in Australia* (MCEETYA, 2003) states that schools recognise students' needs to be provided with skills, knowledge and an understanding of ICT so they will be equipped for lifelong learning as well as employment. The MCEETYA ICT in School Taskforce is responsible for giving strategic advice to each state's education minister on issues that relate to the use of ICT in schools (MCEETYA, 2005).

More recently reports have focused on pedagogical and leadership strategies (Curriculum Corporation, 2005, 2006). One major initiative was the creation and investment in 'The Learning Federation'. This fifty-five million dollar Australian and New Zealand joint federal and state government project was designed to produce online curriculum materials to engage students and their teachers in creative and critical thinking and encourage the marketplace for high quality curriculum materials (Curriculum Corporation, 2001). Commonly called 'learning objects', there are varying levels of awareness in schools of the availability of these resources, meaning not all schools are actively using these materials (Freebody, 2006).

The Trinitas report (Trinitas Pty Ltd, 2000) suggests that digital curriculum materials can improve basic skills, improve teacher effectiveness, lessen disengagement of students through varying approaches to teaching, and achieve the goals set out in *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* (Department of Education Science and Training, 1999). This includes the goals of embedding ICT within the curriculum and developing digital content. Other projects being developed by the Australian government have included the 'Computers for Schools', Education Network Australia (EdNA), Online and Netd@ys (Minister for Education Training and Youth Affairs, 2000).

Educational use of learning objects has become an area of research in Australia. One study suggested that learning objects do engage students and sustain their attention, and appear to be an effective ICT tool (Chapuis, 2003). Another study investigating mathematics and numeracy learning objects reported that students were engaged when using the learning objects (Clarke & Gronn, 2004). The Trinitas report supports this study by suggesting the use of learning objects lessens disengagement in the classroom (Trinitas Pty Ltd, 2000). Studies by Freebody (2005; 2006) report improved learning

outcomes and increased engagement with teachers responding positively to using learning objects in their classrooms.

Thus, the Australian government has endeavoured to take a centralised approach to ensuring that infrastructure is available in each state (Minister for Education Training and Youth Affairs, 2000). Investment has also been put into creating online digital content for all Australian Schools (Curriculum Corporation, 2001). In 2005, the government formed the 'Australian Information and Communications Technology in Education Committee'. This committee was formed to encourage the advancement of teaching and learning through effectively and efficiently using ICT (Australian Information and Communications Technology in Education, 2006), to enable all education sectors to grow.

2.2.3 The New South Wales Context

The current study was undertaken in schools in the state of New South Wales. The New South Wales Department of Education and Training (DET) states a commitment to quality teaching promoting a framework using quality teaching based on three dimensions of pedagogy (Professional Support and Curriculum Directorate, 2003). These are that it is based on promoting quality learning environments; that it is based on promoting a high level of intellectual quality; and that it is "pedagogy that develops, and makes explicit to students the significance of their work" (Professional Support and Curriculum Directorate, 2003, p. 5). Within this overarching framework the department has made a strong commitment to ICT and its implementation in schools. It has commissioned research such as *Net Gain?* (Hayes, Schuck, Segal, Dwyer, & McEwen, 2001) to acquire a greater understanding of computer based learning in schools. This report, in part contributed to the development of the *DET ICT Strategic Plan* that is updated on a regular basis and based on the *NSW Public Schools Strategic Directions 2002-2004*. This states that students are to have ICT skills to meet their educational needs (New South Wales Department of Education and Training, 2002b), which includes skills in using the Internet. The *ICT Strategic Plan* includes an ICT vision and key goals to support the strategic directions for schools which was hoped to provide a quality learning environment with outstanding teaching and success for all students (New South Wales Department of Education and Training, 2002a).

One of the New South Wales Department of Education and Training's main initiatives was announced specifically in order to address unequal access to technology. This initiative was developed in 2002 and was the introduction of 'e-learning accounts' for all public school students and teachers at a cost of \$33 million ("Student accounts in e-learning package," 2002). It was planned that a total of 1.2 million accounts be established to provide filtered access to the Internet, use of supervised discussion boards, Internet publishing facilities for students and teachers, as well as access from any computer to the Internet and technical support 24 hours per day. The teachers' union, the New South Wales Teachers' Federation, quickly opposed the e-learning accounts stating schools' technology infrastructure was not adequate for the success of the project (Currie, 2004) and they subsequently recommended teachers not introduce the accounts into schools or classrooms. Thus, at the time of this research schools do not use the accounts although they have been developed for staff and students. It is expected they will be implemented in some way in the future.

Another state wide initiative was to implement standardised computer skills testing for all Year 6 and Year 10 students. This was an attempt to measure the effectiveness of computer teaching within schools. The test was initially introduced to all Year 6 students.

Currently, the Year 6 Computer Skills Test is a state-wide public school test that occurs in May each year. The multiple-choice test was first completed with pencil and paper. However, during 2004, the year of the data collection for this book, there was a state-wide trial of the practical test with all students in the state completing a test on the Internet. The topics covered in the test were substantial with students needing to gain an understanding of databases, spreadsheets, word-processing and graphics applications, and use of the Internet, including email (Office of Information and Communications Technology, 2003). It was a significant challenge for teachers to effectively integrate technology experiences into learning activities in the classroom to ensure that students could be successful in the computer skills test. Once again, the teachers' union, the New South Wales Teachers' Federation, reported members had expressed concerns regarding the tests, including having technical problems as well as organisational problems, which included computer laboratory availability which hampered the running of the test (Leete, 2005, May). Thus, the tests were suspended in 2005 to be reconfigured for use in future years (Leete, 2005, May), although this had not yet occurred.

As in other developed countries the Australian Federal government has accepted responsibility for Internet safety for its citizens. In 1999, it created the Internet safety advisory body *NetAlert*. Its role is to work with other government agencies to promote Internet safety, to provide helpful and reliable advice and initiate research into filtering products (NetAlert, 2003). The New South Wales Department of Education and Training has developed an acceptable usage policy for schools which includes information for all parents about student Internet access and email accounts (New South Wales Department of Education and Training, 2006).

This range of initiatives demonstrates the New South Wales government's attempts to implement quality teaching initiatives to improve student outcomes in the New South Wales school system (Professional Support and Curriculum Directorate, 2003). The New South Wales Department of Education and Training has also implemented the *ICT Strategic Plan* to assist in enhancing student learning (New South Wales Department of Education and Training, 2002a).

2.3 Implementing ICT in Schools

This study investigates how ICT, and specifically Internet technology is implemented in schools. Section 2.3.1 includes studies that have implemented ICT in education. This is broken down further with Section 2.3.1.1 discussing the leadership of ICT implementation and 2.3.1.2 reporting on teacher professional development. Finally, the barriers to using ICT in the classroom are raised (Section 2.3.2).

It is argued that in the digital age it is important to have new curricula and to adopt the use of ICT in schools (Prensky, 2006) because even when ICT is readily available, many teachers are still struggling with identifying and providing opportunities for students to develop the technology knowledge and skills needed (Prensky, 2006). This is despite the availability of print-based and online resources to assist teachers with lesson ideas and to help them acquire the skills needed to successfully incorporate technology and, in particular, Internet-related lessons.

2.3.1 Studies of the Implementation of ICT in Education

Successfully implementing ICT in education can follow the principles of school improvement in other areas. Fullan (1992) suggests that in order to succeed

“implementers have to gain a clear understanding of what to do and change in order to put the innovation into practice” (p. 31).

Today most primary schools in New South Wales have a whole school technology plan or policy to assist in the implementation of ICT throughout the school. These plans have been developed, often by the computer coordinator, over a number of years with schools often struggling to successfully integrate ICT throughout the school (Hayes et al., 2001). In New South Wales the *NetGain? The Integration of CBL in six NSW government schools* project determined that a whole school technology plan or vision ensured that the school executive had a greater understanding of the school’s goals (Hayes et al., 2001). This project also reports that leadership is critical to the successful implementation of ICT in the school environment (Hayes et al., 2001).

Research has shown that there may be a lack of evidence for implementing ICT using innovative methods (Tearle, 2003). In the United Kingdom, Tearle (2003) suggests that some schools have managed to:

Embrace the use of ICT in teaching and learning with many subject areas, whilst others, despite apparent desire, determination and even allocation of significant resources for ICT development, have struggled (p. 568).

Tearle’s study suggests “that ICT was being used as a tool for learning with little recognition of its potential role as a catalyst for social and local change” (Tearle, 2003, p. 579). Dexter (1999), suggests that for successful technology implementation the entire school culture is required to participate in the reform.

An Israeli study examined how teachers planned use of ICT in their teaching, focusing on primary school teachers, and concluding that they had three patterns of planning (Tubin & Edri, 2004). The patterns included ‘flow’, ‘fulfiller’, and ‘flexible’ patterns, with the ‘flexible’ pattern teachers reporting the greatest success in implementation ICT usage. The ‘flow’ pattern was characterised by the teacher outlining the plan, but not knowing the finer details which instead emerged over time. The teachers felt they were responding to the plan but did not have details about the implementation. The ‘fulfiller’ pattern was an organised and structured plan that needed to be implemented precisely, and the ‘flexible’ pattern was a plan “based on the assumption that change could take place during the implementation phase” (Tubin & Edri, 2004, p. 186). While the patterns had common factors it was reported the flexible pattern was the most efficient as it allowed for an adaptable approach to ICT implementation in teaching and learning situations with ‘flexible’ teachers reporting full implementation (Tubin & Edri, 2004).

2.3.1.1 Leadership of ICT Implementation

School leadership is important if ICT use is to become an integral part of a school (Anderson & Dexter, 2000). Various types of leadership are needed to ensure ICT implementation in schools. One leader in the school is the school principal who can be seen as “central to promoting or inhibiting change” (Fullan, 2001, p. 138) but other leaders are also needed with regard to leadership in ICT implementation, with one of these leaders being the school computer coordinator. School principals are leaders who are necessary to promote change in general within the school culture. It has been suggested that ICT can foster and promote various degrees of change in educational organisations and strong leaders are important (Yuen et al., 2003). In a study of school principals conducted in Canada, it was determined that principals also need pedagogical and technical training if the integration of ICT is to take place (Isabelle & Lapointe, 2003). More recently in

Australia, Moyle and Webb (2006) report that school principals “also require a working understanding of the curriculum and, organisational issues of the professional learning implications that arise from deploying ICT into teaching and learning across schools [sic]” (Moyle & Webb, 2006, p. 5).

The other key leader in the successful implementation of ICT in education is the school computer coordinator. A New Zealand study conducted in 25 secondary schools found that computer coordinators acted as agents of change and it was important to have a leadership role by becoming planners, managers, envisionsers, trainers and technicians (Lai, Trewern, & Pratt, 2002). This study identified three main obstacles to implementing effective leadership. These were workload issues, as the role of the computer coordinator was often taken on in addition to other duties; the need for technical support from qualified technicians; and the lack of professional development available. This study concluded that the “coordinator is the person who could play a major role in the planning and implementation of technology integration in the school” (Lai et al., 2002, p. 550). Lai and Pratt went on to further investigate the role of the computer coordinator, and concluded that they were knowledgeable and enthusiastic about the use of ICT in schools and were well placed to be good leaders in the area of technology implementation. However, this leadership role was not usually recognised at the schools in the study and the position of the computer coordinator was not a full time one (Lai & Pratt, 2004).

In Hong Kong, a study investigating various models of change using ICT in schools found that the variety of pedagogical practices being used involving ICT was dependent on the vision of the leaders of the school (Yuen et al., 2003), as well as their:

understanding of the role and impact of ICT in the curriculum, their goals and objectives for ICT integration, as well as the history, culture and background of the school and its general vision and mission (p. 158).

Thus, it is important for schools to demonstrate leadership with regards to ICT implementation. School principals (Isabelle & Lapointe, 2003) and computer coordinators are often responsible for this in schools (Lai et al., 2002). It is also important for school leaders to have an understanding of the curriculum and pedagogies (Moyle & Webb, 2006; Yuen et al., 2003).

2.3.1.2 Teacher Professional Development

Professional development of teachers is prominent in the literature regarding ICT implementation in education. The research repeatedly highlights the concept of professional development for teachers and methods of ‘best practice’. There is also a focus on how professional development can improve ICT integration into the curriculum and using the Internet as a tool for classroom teaching and learning. In a British study, teachers responded that they felt training alone to be ineffective in developing of ICT skills and a more holistic approach was required (Williams, Coles, Wilson, Richardson, & Tuson, 2000). Other researchers who surveyed primary school children in Canada argue that teacher professional development meets both individual and ongoing teacher support needs if it is focused on instructional techniques rather than hardware issues (Ross, Hogaboam-Gray, & Hannay, 2001).

As part of a large study conducted in Australia, Webb, Robertson and Fluck (2005), specifically researched teacher professional development. Their findings suggest professional learning activities need to “focus explicitly on the practices to be used in the

class programs” (Webb et al., 2005, p. 626). This contrasts to most professional development programs which are generally focused on developing teachers’ ICT skills and knowledge (Webb et al., 2005). The study also suggested that it can be advantageous to integrate teacher skill development with lesson development and classroom practice whereas currently many professional development programs place emphasis on ICT skills and knowledge. Another study conducted in the United Kingdom, also argues that teacher professional development should be in context with regular classroom practice (Levin & Wadmany, 2005). Another study conducted by Falvo (2003) suggests that teachers show high levels of commitment and subsequently spend a great deal of time developing their skills and devote longer hours developing lessons with their new skills following realistic professional development (Falvo, 2003).

One study was conducted comparing three different ICT professional development models in Canada: teachers attending a university based program, a school district based program and a school based program (Jenson, Lewis, & Smith, 2002). Teachers attending the university based program commented that it was:

an excellent example of a scaffolded, peer-supported program in which teachers explore and learn to use technology, setting goals for technology applications in their classrooms based on their own subject interests (p. 484).

Two teachers in the study reported different benefits using this model. One found the methods of collaborating with others useful, while another teacher did not use this peer support network although it was found that the professional development increased her skill level and confidence and she was able to increasingly develop problem solving skills, even though the professional development focused on teaching with using technology. Both teachers reported they were using computers with their students in more meaningful ways (Jenson et al., 2002).

The second professional development model evaluated by Jenson, Lewis, and Smith (2002), was at a school district level. A leading school in using ICT, hosted teachers and principals for a four day conference during which technology was showcased and hands on workshops were available for teachers and principals to attend. Principals were interviewed after the conference and felt that their teachers “were now more actively working to implement technology in their classrooms” (Jenson et al., 2002, p. 489). Teachers felt that they learnt what they could do with their classes but they had not learnt enough skills to incorporate into their classroom teaching.

The third model was a school based experience in which an ICT expert in the school assisted colleagues in using “computers with their students” (Jenson et al., 2002, p. 490). One teacher found that time was a factor with this professional development as she was only given a few hours per day to assist other teachers (Jenson et al., 2002). The teachers at the school viewed the role of the technology expert as vital and felt that it was important to have a person who could make recommendations about using technology in their subject area as well as provide technical support (Jenson et al., 2002). This is similar to the model of professional development developed by many schools in New South Wales, Australia.

The findings from the Jenson study (2002) are supported by Barak (2006), who conducted a different study which focused on twenty five teachers attending a university based graduate course on using ICT in science and technology. This researcher reports that

although teachers might “introduce advanced technologies for their own learning, they are careful and sensible regarding the extensive use of ICT in school” (Barak, 2006, p. 134).

Another group of researchers suggest that the confidence of teachers may have an impact of the uptake of ICT within the classroom as Danziger, Jennings and Park (1999) put forward in a business report on *Assessing the Value of ICT Training*:

employees who are more confident about the likelihood of successfully utilising an ICT system will generally utilise the system more often than employees who are less confident, and they are more open to adapting to new possibilities in the uses of ICT in their work (Danziger et al., 1999, p. 18).

These authors go on to state that training in ICT is important because employees “do not have the level of ICT competence to take full advantage of the technology that is already on their desktops” (Danziger et al., 1999, p. 25). Goodison (2003), suggests that staff development should teach ICT for understanding and lesson design, and then teach various hardware and software as this may enhance the quality of the learning experience for the teacher. Goodison (2003), goes on to suggest that such professional development should be learner or student centred. This student centred approach is supported by Beck (2001), who suggests that teachers should participate in practical ICT based professional development sessions.

As can be seen above, the professional development of teachers in relation to teaching with ICT is important (Webb et al., 2005; Williams et al., 2000). Increased and more effective professional development will assist with the integration of content and skills into classroom teaching, making it a more student centred learning environment (Goodison, 2003). As the teacher has a significant role in the classroom, professional development will perhaps play an important role with teachers in this study.

2.3.2 Barriers to Using ICT

The barriers to using ICT in educational settings have been well documented (BECTA, 2004; Bitner & Bitner, 2002; Gibson & Oberg, 2004; Lim & Khine, 2006). These include a lack of professional development for teachers, a lack of time to learn and use technology, which includes Internet technology, and a lack of available ICT infrastructure.

The barriers to using ICT in the classroom are not unique to Australia (cf. Royer, 2002). The US National Center for Education Statistics (NCES) which conducted large scale surveys, reports that the majority of teachers indicated they had received some training in ICT, but only 20 percent felt “very well prepared to integrate educational technology into classroom instruction” (NCES1999). Jones (2002), recommends that teachers have a good understanding of computer hardware and software in order to teach students using good pedagogical practices. Bitner and Bitner (2002), support this by suggesting that the teacher needs to learn to use the technology and then needs to allow the technology to change their teaching paradigm. This is also supported by Cuban (1999), who goes on to suggest that changes in procedures are needed to ensure that teachers are able to utilise computers to their full potential.

It is suggested that it is central to ensure that teachers receive professional development in learning how to teach with ICT across the curriculum. Jones (2002) states that it is important to provide staff training in ICT and that teachers need to have achieved personal ICT competencies prior to gaining pedagogical competencies. Jones (2002), suggests

that for schools to succeed in this they need to invest in the professional development of staff initially in ICT, in order for the staff to develop appropriate pedagogies in teaching with ICT.

Other researchers have reported that teachers need professional development in using the Internet and other technologies (Gibson & Oberg, 2004; Zakopoulos, 2005). A detailed study of Internet use by Canadian teachers reports on factors limiting Internet use in Canadian schools (Gibson & Oberg, 2004), which include a lack of infrastructure, direction and teacher support. Participants in this study reported that professional development of teachers was a critical factor in having effective Internet use in Canadian schools (Gibson & Oberg, 2004). In the study “80 per cent of administrators and teachers reported that their ministry of education did not provide adequate infrastructure support for using the Internet in teaching” (Gibson & Oberg, 2004, p. 576). Teachers and administrators also indicated that they thought the school districts were not providing enough support (Gibson & Oberg, 2004). An in-depth study of two schools over two and a half years in the United Kingdom suggests that teachers need further training in the use of the Internet, digital cameras, emailing, video conferencing and the use of camcorders (Zakopoulos, 2005).

One of the major barriers to the implementation of technology is the issue of lack of time. Cuban, Kirkpatrick, and Peck (2001), suggest that teachers need time to preview Internet sites and locate images for multimedia projects, and time to upgrade their skills. These researchers also highlight the issue of lack of time as it was repeated by teachers from various faculties in two schools throughout their study. In another study, 60 per cent of teachers surveyed felt that they had limited time available to use the Internet due to lack of access to current and reliable technology (Gibson & Oberg, 2004). Findings from a different study conducted in the United Kingdom, over two and a half years suggest that teachers lack of time to both plan and implement their ICT lessons was in part due to curriculum restrictions, as well as because teachers needed further training in the use of ICT in the classroom (Zakopoulos, 2005).

In a study of teachers in Tasmanian schools, the authors reported that having only two networked computers located in a classroom required the students to withdraw from the class to access the computers. This may not have provided the best use of the available technology. Six computers may in fact be better as they could be used for group work with ICT being integrated into the class teaching and learning activities (Robertson et al., 2004). This suggests some teachers may have problems integrating ICT with only two computers in the classroom, whereas having a cluster of computers assists teachers with integrating ICT into the classroom.

2.4 Using ICT in the Classroom

This section describes how ICT is used in the classroom. Section 2.4.1 reports specifically on how ICT is integrated in the classroom. This literature is important to this study because integrating ICT is one of the priorities suggested by the New South Wales Department of Education and Training. There has been some policy development pertaining to this area in the past few years (New South Wales Department of Education and Training, 2001, 2002a).

In the late 1990s, researchers were reporting on how and how often teachers were using computers and other technologies in the classroom (Dexter, 1999; Peha, 1995; Reilly, 1999; Serim & Koch, 1996). One study states that over half of primary and middle school teachers were non-users of ICT in their teaching (Cuban, 1999). This appears to have

shifted slightly as Zhao and Frank (2003) conducted an in-depth study of nineteen schools that looked at the degree to which technologies were used in schools. They found that email, telephone systems and computers in the classroom were used most often, with video/television, computers in a laboratory and the Internet used less often. Zhao and Frank's (2003) study suggests that teachers used computers for lesson preparation and communicating with both parents and students. Student use of computers in these schools included record keeping, using computers as an incentive or reward, and the development and remediation of core curriculum skills. Student based inquiry such as the use of electronic databases and WebQuests were not common.

Improved student learning is one outcome teachers often strive for. There are a number of studies that report that teachers who have been using ICT within the classroom suggest student learning is improved (Reynolds, Treharne, & Tripp, 2003; Robertson et al., 2004; Serim & Koch, 1996). This is evident in a study conducted in the United Kingdom by Reynolds, Treharne and Tripp (2003), which determined that 83% of teacher respondents reported that the standard of student achievement was increased when technology was used in the classroom. This included 16% of teachers who felt that underachievers particularly benefited. One of the explanations provided was that the teachers believed that ICT motivated students (Reynolds et al., 2003). However, other responses indicated that the "financial, social and organisational costs of using ICT – is a factor which is still lacking" (Reynolds et al., 2003, p. 166), perhaps suggesting that standards have not actually been raised. An Australian study conducted by Robertson, Fluck, Webb and Loechel (2004), suggests that teachers who make the best use of ICT already model known best practice in good teaching. These teachers are able to scaffold students' learning for maximum effect (Robertson et al., 2004). Perhaps when this occurs, higher standards and outcomes are achieved in the classroom.

One requirement for teachers to use various technologies effectively in the classroom is for them to understand computer hardware and to know what software is available (Bitner & Bitner, 2002; Jones, 2002). Jones (2002), suggests that teachers need to have a good understanding of computer hardware and software in order to teach students using good pedagogical practices. Bitner and Bitner (2002), support this in suggesting the teacher needs to learn to use the technology and then needs to allow the technology to change their teaching paradigm. It is also important to acknowledge the importance of technological skills and to train staff in these skills (Jones, 2002). Jones (2002) suggests these are important steps in working towards using appropriate pedagogies in teaching technology.

According to Serim and Koch (1996), students can direct their own learning when using the Internet. ICT can also encourage students to use higher order thinking skills to solve problems. Serim and Koch (1996) suggest that the Internet actively supports students' learning and higher order thinking by eliminating barriers to accessing information (Serim & Koch, 1996). Wyld and Eklund (1997) argue that students also have access to a great amount of information and resources that may not have been available in schools previously. However, although this information may be readily available to skilled users, Arif (2001) argues that some students may not be ready to use the Internet effectively as they may struggle with the knowledge required to use the technology. Furthermore, as web pages often use a non linear format students may need to adjust their "learning strategies to meet the challenges of the new format" (Arif, 2001, p. 2).

Some researchers suggest that teaching styles may influence how ICT is used in the classroom (Becker, 2001; Robertson & Fluck, 2002). One study compared two teaching

styles: a teacher centred approach, and one in which a student centred approach was used, where the teacher acted as facilitator (Robertson & Fluck, 2002). The researchers report that personal confidence was an issue and thus the teacher chose to be 'in control' "and student independence was not to the forefront of classroom organisation" (Robertson & Fluck, 2002, p. 4). These researchers planned to conduct more research into "teachers' confidence levels with ICT and their role perceptions along a continuum from facilitator to controller" (Robertson & Fluck, 2002, p. 13). A report based on a national survey from the United States suggests teachers felt more comfortable (64%) and thought students preferred (53%) a traditional approach to teaching with ICT (Becker, 2001). Teachers indicated that they recognised that students benefit from inquiry teaching, although they felt that it could be difficult to use when teaching so they generally preferred using a traditional approach (Becker, 2001). Thus, although teachers recognised that it may be advantageous to use ICT in their teaching, as well as use an inquiry teaching method, they often used a traditional approach as that is how they felt comfortable.

Research is beginning to emerge about engagement and student learning. In a study conducted on Year 1 and Year 2 students, the teachers interviewed believed computers improved student engagement and provided interaction in a multi sensory form (Cooper & Brna, 2002). Prensky (2005b) suggests that teachers need to prioritise engagement over content when teaching, and that outside of school students are engaged in their digital lives and thus educators need to engage students electronically. However, Prensky appears to have conducted no research in this area. Thus, although some research suggests students are engaged when using ICT, more research in this area is still needed.

2.4.1 Integrating ICT in the Classroom

The introduction of computer technology into schools has not necessarily proceeded smoothly, according to Wartella and Jennings (2000). They draw comparisons to the introduction of movies, television and radio and suggest that the introduction of ICT into the classroom "parallels the introduction of previous waves of new media technology throughout the past century" (Wartella & Jennings, 2000, p. 39), where children's experiences of new technology have had quality problems. Cuban (2001), suggests that although new technologies have been introduced into schools they are not being used effectively, and that teachers are slow in the uptake of new technologies. Teachers will eventually use ICT in the classroom but this will take time and involve changes in education and a new cohort of teachers to be employed who are able to embrace this use of ICT (Cuban, 2001).

Selwyn and Bullon, (2000), suggest that there will be greater emphasis on teaching with ICT in the next ten years. They conducted a study of primary students in Wales in which 73% of the students interviewed reported having access to ICT which included either Play Station or Nintendo at home (Selwyn & Bullon, 2000). Today, students often have access to computers with the Internet as well as games machines, and technology has evolved rapidly (Calvert, 1997), with increasing availability to students.

Norton and Wiburg (2003) argue that there are two main approaches to teaching ICT in the classroom: the process or skills based approach; and the integrated approach. The process approach focuses on teaching skills in an isolated manner where they are taught out of context to the curriculum. The integrated teaching approach is regarded as the teaching of skills in context with the curriculum and class learning. A similar definition of ICT integration (Shelly et al., 2006) is:

the combination of all technology parts, such as hardware and software, together with each subject-related area of curriculum to enhance learning (p. 339).

Research is occurring on how the use of ICT is integrated into class teaching (Boyle, 2005; Robertson et al., 2004; Webb et al., 2005). For example, one school district in the United States felt that integrating ICT into the curriculum and teaching skills in the context of real world situations were important to improving student computer proficiency results (Boyle, 2005). This school district determined that software called EasyTech would assist in integrating ICT within their core curriculum. The main outcomes from this process were that students became more computer literate and willing to engage in problem based learning (Boyle, 2005).

Schools need to acknowledge the importance of ICT within the curriculum (Jones, 2002; Robertson et al., 2006). A recent Australian study by Robertson, Grady, Fluck, and Webb (2006), indicates that many teacher participants acknowledge ICT is more or less integrated into their classroom curriculum. In this study of 64 participants interviewed 30% suggested this; while 16% stated that integration occurred in a more moderate way and 20% of these teacher participants felt this occurred in a limited way. This same study also found 30% of participants felt ICT has the capacity to allow students to learn more effectively with 25% of participants mentioned using strategies involving ICT as making teaching more child centred and inquiry based (Robertson et al., 2006).

As can be seen above ICT can be integrated into the classroom in a number of ways. This can include using an integrated approach when teaching (Norton & Wiburg, 2003) or using software such as EasyTech (Boyle, 2005). Another way ICT can be integrated into the classroom is through the use of the Internet as is demonstrated in the next section.

2.5 The Internet in the Classroom

This study focuses on what is a relatively new addition to classroom educational resources, the Internet. As with other technologies the Internet is now playing an increasingly important role in classrooms today (Oberg & Gibson, 1999), and it is largely dependent on classroom teachers to ensure that all students spend their time usefully on the Internet (Wyld & Eklund, 1997). However, teachers do not always feel they have adequate training to teach students using the Internet (Oberg & Gibson, 1999; Wyld & Eklund, 1997). In an early study by Davis (1992), more than 50 percent of graduate teachers felt 'not prepared at all' or 'poorly prepared' to teach using the Internet while only 20 percent stated that they were 'adequately prepared', 'well prepared' or 'very well prepared' to be able to use technology for instruction (Davis, 1992). Another study conducted in 1999 by the US National Center for Education Statistics (NCES), found that the majority of teachers indicated they had received some training in technology, including Internet technology, but only 20 percent felt 'very well prepared' for being able to integrate technology, including Internet technology, into classroom activities (US Department of Education National Center for Education Statistics, 1999). There appears to be little research today telling a different story.

The Internet can be used as a tool to support student learning although it is important that teachers are comfortable in encouraging students to use the Internet (Wyld & Eklund, 1997). Wyld and Eklund (1997) suggest that the Internet provides educators with the opportunity to implement a range of new teaching and learning practices. Through the use of ICT teachers can foster a range of learning styles, support a student centred learning

environment, develop cultural understanding, promote real life experiences, provide another publishing medium, promote community and parental involvement as well as enhance students' skills in using this technology (Fly-Jones, Valdez, Nowakowski, & Rasmussen, 1995; Wyld & Eklund, 1997). Fly-Jones et al, (1995), state that classrooms in which students learn collaboratively engage students in their learning, which is especially true with teaching using ICT, including Internet technology.

A study by Oberg and Gibson (1999), suggests that teachers feel that the Internet is an important tool for student learning. The study conducted in Alberta, Canada it was suggested that 78% of teacher respondents believed the Internet is an important tool for teaching and 76% for student learning (Oberg & Gibson, 1999). However, Barak (2004), from an Israeli study involving interviews of 200 students in Years 10 – 12 concluded that teachers and students prefer conventional lessons as a way for learning concepts (Barak, 2004). This study focused on the subjects of electricity and electronics and although the teachers and students used the Internet extensively only a few teachers and students used it to augment course content (Barak, 2004).

One teacher has reported creating an Internet website in an attempt to connect the school and the home (Sumner, 2000). All students in the class had a webpage of their own and they were then able to put work on their page on the premise that this gives the students a real audience of other users of the Internet (Sumner, 2000). Sumner (2000), also reports that other teachers in the school have begun their own class web pages, thus increasing the connection between school and home.

Teachers are faced with particular barriers when using the Internet (Falvo, 2003; Herring, 2001; Wallace, 2004). These barriers include a lack of quality control of websites, lack of professional development in using the Internet in teaching (Herring, 2001), and teachers teaching new content not familiar to them (Wallace, 2004). Herring (2001), also argues that lack of quality control, not everything being available on the Internet as well as lack of professional development and other similar barriers to prevent teachers using ICT to their best advantage. One in-depth study (Wallace, 2004), conducted in the United States, of three teachers who used the Internet in their teaching, indicates that Internet activities take time and energy to be successfully incorporated into teaching. Although the Internet allows students to have access to current information this can be a limitation as teachers end up teaching new content they themselves may not be familiar with (Wallace, 2004). Wellington (2005), reports that there is immense pressure from parents, television, and industry to utilise the Internet in education. However, Somekh (2004), suggests that schools in the United Kingdom are constrained by various issues regarding students using the Internet which includes students inadvertently accessing inappropriate material, 'meeting' paedophiles online and teachers' fear of prosecution in the event of anything happening to a child in their care (Somekh, 2004). As has been mentioned in Sections 2.2.1 and 2.2.3 above, Internet safety is taken seriously by governments across the world.

Thus, using the Internet in classroom teaching has various barriers that are not dissimilar to the barriers pertaining to ICT and teaching generally. Even with these barriers, however, teachers feel the Internet can be used as a tool which supports student learning (Oberg & Gibson, 1999; Wyld & Eklund, 1997).

2.5.1 Using the Internet to Enhance Student Learning

In recent years teachers have increasingly used the Internet to enhance student learning (Gibson & Oberg, 2004; Oberg & Gibson, 1999; Tancock & Segedy, 2004; Wallace, 2004).

In a study conducted in Canada on 840 teachers of Grades 5, 8 and 11, on Internet use in educational settings, questionnaires were administered to teachers, administrators, ministry officials and teacher association officials. Responses to the questionnaire identified two main purposes for using the Internet: as a tool for enhancing student learning; and as a tool for enhancing teaching. Survey respondents viewed the Internet as valuable for both purposes (Gibson & Oberg, 2004). Teachers reported that students mainly used the Internet to search for specific information and to explore the Internet to gain information on particular topics. Searching the Internet for information for lessons and locating electronic lesson plans were the two most reported uses of the Internet for teachers (Gibson & Oberg, 2004). In the survey, fewer than 15% of teachers reported “that their students were making use of the Internet in any way that might be considered as innovative, such as using the virtual field trips, simulations and demonstrations which are available on the Internet” (Gibson & Oberg, 2004, p. 574). Thus, this study suggests the Internet is predominately used for searching purposes and for supporting teaching rather than learning.

In the United Kingdom, research has been conducted on the use of ICT, particularly the Internet, to support science teaching in primary schools. This study conducted in six primary schools researched tasks relating to the topic of ‘Forces and Motion’ and how the Internet could be used to support this teaching (Skinner & Preece, 2003). The findings of this study suggest that teachers found the Internet has potential to be used for communication and that a website created for study dedicated to primary science was a valuable teaching resource (Skinner & Preece, 2003).

A study by Tancock and Segedy (2004) conducted on fifteen students in Year 2 in the United States investigated whether using ICT and the Internet in the reading curriculum would be motivating to students. One key challenge for the students was being able to navigate the Internet, particularly with its non linear nature. The study found that students who used the computers were more likely to share what they were typing and creating as well as help each other (Tancock & Segedy, 2004). Another study in which a university team went into schools to conduct ‘Tech Days’ each week reported increased student and teacher motivation (Hruskocy, Cennamo, Ertmer, & Johnson, 2000). The researchers report that the ‘Tech Days’ also impacted on student learning with students becoming more independent learners in the classroom (Hruskocy et al., 2000). It is apparent that using the Internet to support learning can be motivating for students and impact on their learning.

Educators in some countries, such as the United States and the United Kingdom, use software programs that provide online learning environments for educators to use to enhance their teaching. These include earlier software such as *Top Class* and *Learning Space* (Freeman, 1997) as well as programs using current software such as Web CT, MyInternet and Janison Toolbox. These programs “provide for private email, public conference discussions, easy and consistent delivery of resources and progress testing via the WWW” (Freeman, 1997, p. 25). These programs have an easy to use interface that is platform independent (Freeman, 1997). Another of these software programs is *Firstclass*, a program used by universities in the United Kingdom (Barton & Selinger, 2000). Research in the United Kingdom suggests that electronic communication involves people working in a different way (Barton & Selinger, 2000).

As can be seen above, the Internet can be used in various ways to enhance student learning. These ways include teachers and students searching the Internet for information

(Gibson & Oberg, 2004), as a means of communication (Skinner & Preece, 2003) and as a motivational tool (Tancock & Segedy, 2004).

2.5.2 Information Literacy

It is important for students to obtain information literacy skills in order to use the Internet effectively (Herring, 2001; Scott & O'Sullivan, 2000). Students need to develop critical evaluation skills because of the amount of information available on the Internet (Herring, 2001). Although Heil's (2005) study of Year 8 students in the United States had only a small number of participants, the pre-test demonstrated that these students believed the Internet to be a reliable source of information. However, after the designing and teaching of a unit to develop student's critical literacy skills, the students' perceptions of the Internet were "more realistic and better informed" (Heil, 2005, p. 29) with students better able to evaluate Internet sites.

Another study by Scott and O'Sullivan (2000) reports student disenchantment when researching using the Internet as they encountered barriers to obtaining reliable data. In the study, the students were given an Internet website evaluation worksheet on which they assessed each Internet site for accuracy, authority, objectivity, currency and coverage (Scott & O'Sullivan, 2000) and through using this worksheet, the students' information literacy skills improved. This included recognising that some search engines were more effective, and some URLs were more relevant, such as sites which contain the prefixes 'edu' and 'org'. Through using the specific worksheet evaluation students were able to critically evaluate a website (Scott & O'Sullivan, 2000). Thus, information literacy skills are very important to students using the Internet specifically for research. It is important these skills are specifically taught to students. A more recent study by the same researchers (Scott & O'Sullivan, 2005) suggests that Internet information literacy skills need to be taught in all areas of the school curriculum. They recommend students do not solely use the Internet for research but use other sources as well (Scott & O'Sullivan, 2005).

One researcher suggests that teachers should become more information literate (Vine, 2006), and believes that professional development is needed to provide teachers with enough skills to be able to teach information literacy (Vine, 2006). This is supported by Probert (2006), who conducted research in New Zealand and reports that teachers appeared confused about teaching information literacy skills with less than half the teachers in her study modelling these skills to students (Probert, 2006).

Thus, due to the vast amount and varied quality of information on the Internet it is important to teach information literacy skills to students (Herring, 2001). This can be achieved by teaching the students to evaluate Internet sites (Scott & O'Sullivan, 2000). Teacher professional development is another important factor in developing student Internet information literacy skills (Probert, 2006; Vine, 2006).

2.5.3 Email

Email is increasingly being used by primary-school aged children, at school, home and elsewhere. Morton (2001), an early childhood teacher, suggests that by being able to write emails her daughter has been given a real purpose for writing and is keen to improve her writing style because of the added interest it has given her. Morton states her daughter "is proud of the network feeling that emailing others has provided her" (Morton, 2001, p. 4). She also suggests that her daughter feels empowered at being able to communicate with "others around the world, and that she feels comfortable asking for

information, permission or giving suggestions” (Morton, 2001, p. 4). Sumner (2000) gives another example of a child who communicated to her grandfather by email and received a reply with a list of web sites to assist in her class work. Teachers have reported success stories involving using email and many feel students benefit by emailing students in other countries and gaining an insight into different cultures (Abas, 2001, April 26). Harris (2002), suggests that literacy levels are improved by students participating in e-pals projects. This is where students communicate via email to someone outside their family.

Teachers are also using email to communicate with their student’s families. Huseth (2001), is one teacher who for years attempted communicating with the parents of her students by traditional methods such as phone calls and progress reports. She has experienced success more recently as she has developed a class web page because it is her belief that children do better in school when parents are involved in their child’s education at home (Huseth, 2001). The San Diego County Office of Education (1997) not only agrees with this but also reviews the literature that confirm it, stating that children tend to succeed in school and throughout life when families support learning. The last addition Huseth (2001) added to her project was a parent email contact list, through which, every Monday, an email is sent to parents containing homework assignments for the week as well as other communication.

With more parents working longer hours it can at times be difficult for them to come to the school to speak to teachers in person so emailing is becoming a more convenient way to communicate. Teachers are using email to discuss any issues relating to their children and to share information in general. Sumner (2000) agrees that the “quickest way to communicate with some families is through email”. She sends emails when new websites are found so that parents and students may access them as well as sending individual emails to parents and students (Sumner, 2000). An advantage of sending emails is that both staff and students can access them at times of convenience as well as being able to send messages that are very quick in travel time (Martin, 1999).

There are many issues that need to be recognised by teachers when implementing email use in the classroom. For example, these include functional aspects such as the importance of writing the correct address when emailing because one small mistake will mean the email will not be delivered (Kurland, Sharp, & Sharp, 1997). This can be a problem for primary aged children because it is often difficult for them to get long addresses spelt correctly. Other problems can include volume of usage that can slow down access to particular locations and sometimes lines can be down (Kurland et al., 1997).

At the time of this study, the New South Wales Department of Education and Training currently did not provide email accounts for students. This has led to equity issues as not all students have access to email accounts because only some students have access to personal email accounts at home. This has also created problems for some teachers who see the value of email usage and wish to develop their student’s skills in the use of email. Others have overcome these problems in a variety of ways such as setting up class Yahoo or Hotmail accounts or asking the students to get their own individual online email accounts.

2.6 Technology in Society

Although this study focuses on using ICT in the classroom, and Internet technologies, in particular, it is important to discuss technology in society as there have been great

changes in recent years due to increased access to technology. Section 2.6.1 discusses the issue of the digital divide and its implications on society, then Section 2.6.2 highlights key issues about ICT use in the home. Finally, Section 2.6.3 goes on to more specifically discuss Internet use at home.

Since the beginning of the 21st Century there has been a digital revolution throughout society (Education and Training Committee, 2006) including in schools and the home, meaning students now have access to technology in various locations. It has been claimed that “students have changed rapidly” (Prensky, 2001, p. 1) with these new technologies having transformed the way students learn (Spender & Stewart, 2002).

Education has been impacted by the introduction of the Internet into society (Hill et al., 2004). Internet based technologies are expanding and changing at an exponential rate (Hill et al., 2004) with students and teachers alike needing to keep pace with these changes. Although the access they have to these technologies has varied considerably.

2.6.1 Digital Divide

The advance of technology and its widespread use in the home has led to the development of the term the ‘digital divide’, to denote differences between the ‘haves’ and the ‘have-nots’ in terms of technological availability. This phenomenon is worldwide, particularly within developed countries, and is defined by The Henry J. Kaiser Family Foundation (a non-profit, private operating foundation that is dedicated to providing information and analysis on various issues to the public) as “the gap between those who have ‘ever’ and those who have ‘never’ used a computer or the Internet” (The Henry J. Kaiser Family Foundation, 2004, p. 1). DiBello (2005) and The Henry J. Kaiser Family Foundation (2004) both suggest that what constitutes the divide is becoming more complex and changing as technology is evolving.

Although in some countries the digital divide appears to be lessening, there is still a divide between income groups. For example, in the United States, the Kaiser Foundation’s survey in 2000 students between the ages 8 to 18 showed that 96% of respondents had been online with 61% of respondents using the Internet on a typical day. However, only 66% of students from families with an annual income of less than \$US35,000 had Internet access at home and 54% of these students used the Internet on a typical day. In comparison, 84% of students from families with an annual income of \$US50,000 or more had Internet access at home and 71% of students used the Internet on a typical day (The Henry J. Kaiser Family Foundation, 2004). This demonstrates the existing digital divide and the inequity that exists for students of low socio-economic status.

A study by Warschauer, Knobel, and Stone (2004), that was conducted in a seven month period in eight Californian schools also highlights the digital divide within the United States. The study was conducted in 64 classrooms and found that both low and high socio-economic schools had comparable numbers of computers and Internet connections in their classrooms. In Science classrooms, technology was used in similar ways in both high and low socio-economic community schools, but in other subject areas there were many differences. These included students in high socio-economic schools students using the computers “to plan, edit, and analyse essays and to conduct research on the Internet” (Warschauer et al., 2004, p. 572), which often used higher order thinking, compared with creating PowerPoint™ presentations and writing essays, for students from low socio-economic schools. Students in high socio-economic schools also completed more research and analysis in both mathematics and in the language/arts areas (Warschauer et

al., 2004). Their study reports that teachers from lower socio-economic schools tended to have less training and were more likely to be new graduates. Student absenteeism and lack of computer access at home are also contributing factors in the digital divide in the United States (Warschauer et al., 2004), as is lack of home access (The Henry J. Kaiser Family Foundation, 2004). It has been argued about students who have no Internet access at home that “schools are the primary source of Internet access and often the only place they go online” (The Henry J. Kaiser Family Foundation, 2004, p. 3).

According to Norris (2001), one important consideration in attempting to address the digital divide in developed countries is to ensure that all groups (including those in poorer areas, rural locations and the working class) are included in strategies which limit the problem. These strategies are varied and include providing equity of access to the Internet. However, it was previously argued that “the digital divide is widening rather than narrowing” (Howland, 1998, p. 287). This is of concern to the government who have various strategies being implemented (described below) to lessen the gap.

Developed economies such as Australia and the United States have been “at the forefront of the technological revolution [and] may be well placed to pull even farther ahead, maintaining their edge in future decades” (Norris, 2001, p. 5). Australians in general also appear to embrace new technologies (Australian Government, 2005).

There has been an attempt to overcome the digital divide by the Australian government in spending \$AU320 million to fund a project entitled ‘Networking the Nation’. This project has connected more than 2 million people to the Internet and improved rural mobile phone services and training (Coonan, 2005), assisting in bridging the technology gap between the country and the city. There has also been significant investment in improving rural technology infrastructure into homes and schools, with all schools in the New South Wales gaining access to broadband through an e-learning initiative (Department of Communications Information Technology and the Arts, 2004). The implementation of broadband Internet connections for schools has thus been a priority for New South Wales governments (Grebe, 2002; Office of Information Technology, 2002) and very few schools in New South Wales are still equipped with slower, dialup internet connections. This has assisted in reducing technology infrastructure problems across the state.

2.6.2 ICT Use at Home

Many students have access to technology at home. The Australian Bureau of Statistics (2003) reported 95% of students used a computer either during or outside of school hours with 86% of these students using a computer at home. This suggests that today, students often have access to computer technology, and to a lesser extent Internet technology, in the home, with 64% of all children aged 5 – 14 years accessing the Internet either during or outside of school hours (Australian Bureau of Statistics, 2003). It is important to ascertain the educational worth of children’s computer use, both in school and in their everyday lives.

In the United States, 55 million households own personal computers with children making up almost 20 percent of digital media users (Wang, 2002). This is supported by Hoffman, Novak and Venkatesh (2004) who collected data on 1203 households in the United States and found that in 2003, 94% of households with computers had the Internet connected with 31% using broadband. Wang (2002), also suggests children are more likely to use the Internet at home rather than at school and in his study of students in Year 6 it was reported the highest Internet use was to play games.

Children also often use computers at home for leisure activities and more specifically to play games (Downes, 1999). Other student uses of the Internet include writing, constructing and manipulating images and using texts (Downes, 1999).

2.6.3 Internet Use at Home

Today, students often have access to computer technology and to a lesser extent Internet technology in the home (Australian Bureau of Statistics, 2003). As mentioned in the previous section, the Australian Bureau of Statistics (2003) reported that 64% of students between 5 – 14 years accessed the Internet either during or outside of school hours. Of these students 79% accessed the Internet at home and 70% accessed it at school. Twenty four percent (24%) of students accessed the Internet at someone else's home while 7% accessed the Internet at a public library (Australian Bureau of Statistics, 2003). It is reported that students are increasingly using the Internet at home for activities such as to email and to chat with others (Downes, 2002). This author reports children like to 'talk' with friends and communicate with adults (Downes, 2002). Downes' (1999) study included over 400 students aged between five and twelve and she reports that students also used computers at home for school related activities, often school related activities including writing stories, reports and manipulating images. Downes did not specifically investigate students using the Internet but encompassed rather the computer generally, including the Internet.

Other studies suggest students' use the Internet at home in varying ways. The results of Wang's (2002) study of 171 children Internet users at home show that they use the Internet mainly to play games with 56% of participants indicating this. Forty seven percent (47%) of participants used the Internet to access information for school, followed by 32% who downloaded material that is not related to schoolwork, with 29% engaging in other Internet activities such as reading and shopping online. Wang's (2002) study recommends that schools need to share the role of guiding children's use of the Internet with parents. The study also found teachers currently played a limited role in doing this.

One survey shows that Internet usage may vary according to gender. Subrahmanyam, Kraut, Greenfield and Gross (2000) report that boys mostly use their home computer to play games, but girls use the Internet at home to "send and receive email, play with software such as Barbie Fashion Designer, and care for computer-simulated virtual pets" (Subrahmanyam et al., 2000, p. 139).

Goodison (2002) has suggested that with the presence of computers in the home, technology integration in the school should become easier in time when teachers begin to build on the expertise of what children are learning in the home. Another study reports that the Internet is at times used so frequently that it has been suggested that "the computer has become virtually indistinguishable from the Internet" (Hoffman et al., 2004, p. 39).

Thus, students have been accessing the Internet at home, generally to use email and chat programs as well as to access online games (Australian Bureau of Statistics, 2003). This is in line with research by Wang (2002) and Subrahmanyam, Kraut, Greenfield, and Gross (2000).

2.7 Conclusion

It is evident there has been limited research on using the Internet in primary school classrooms, particularly in the New South Wales public school setting. Due to this gap in the research this study focused on the use of the Internet and aimed to find out more about teachers' and students' experiences of Internet-based activities in the classroom.

Despite the continuing improvements in technology available in schools, many teachers are not making effective use of technology such as computers or the Internet. It has been said that "children's actual experiences with previous media often have fallen short of the early visions of the promise of the technology when first introduced, and quality of content issues that have been raised across all media persist today" (Wartella & Jennings, 2000, p. 39). Actual classroom experiences have not met the high expectations of using computer technology, as has occurred in the past with the introduction of other new media such as television and radio (Wartella & Jennings, 2000).

Chapter Three

Methodology

3.1 Introduction

This chapter describes the research process and includes a description of the research methods, data collection procedures and analysis procedures, together with the processes adopted for evaluating and interpreting data. A qualitative research methodology has been used in this study and, specifically, a case study approach was utilised. Both the qualitative research methodology and the case study methodology are outlined below in detail. This chapter revisits the research questions and describes in detail the sources of research data collected from both the students and teachers. The chapter also includes a detailed section on the data analysis techniques employed.

3.2 Naturalistic Paradigm

A naturalistic paradigm was considered appropriate for this study because “the research setting is a naturally occurring event, program, community, relationship, or interaction that has no predetermined course established by and for the research” (Patton, 1990, pp. 39-40). It was also used because the researcher wished to “minimise research manipulation by studying naturally unfolding program or treatment processes and impacts” (Patton, 1990, p. 43).

Naturalistic studies attempt to understand phenomena “in their naturally occurring states” (Patton, 1990, p. 40). Guba and Lincoln (1999) suggest there are five axioms of the naturalistic paradigm that can be applied to research. How each axiom is viewed then becomes dependant on whether the study is scientific or naturalistic (Guba & Lincoln, 1999). In relation to this study the naturalistic paradigm axioms can be described as follows:

1. The nature of reality can be described as multiple realities which mostly exist in one’s mind. Enquiries into the realities can diverge as more and more are considered (Guba & Lincoln, 1999).
2. The enquirer-respondent relationship is where “the inquirer and the object of inquiry interact to influence one another” (Guba, 1985, p. 85).
3. The nature of truth statements relates to generalisations and causality, where “all entities are in a state of mutual simultaneous shaping so that it is impossible to distinguish causes from effects” (Lincoln & Guba, 1985, p. 38).
4. Causality relates to the nature of explanation and “an action may be explainable in terms of multiple interacting factors, events, and processes that shape it and are part of it” (Guba, 1985, p. 85).
5. There is a relation to values where “values impinge upon an enquiry” (Guba & Lincoln, 1999, p. 144).

The research setting could be viewed as natural; that is, it was a genuine school location where the researcher entered the classroom in order to facilitate the required research. Importantly, there was no curriculum intervention by the researcher in the classrooms

where everyday class activities were conducted. It was the intention of the researcher to be as unobtrusive as possible.

The naturalistic paradigm is often referred to as the qualitative or case study paradigm (Guba & Lincoln, 1999). Both qualitative methodology and case study methodology are distinguishing features of the naturalistic paradigm and as a consequence both predominate in this study (Guba & Lincoln, 1999).

3.3 Qualitative Research

Qualitative research provides “a source of well-grounded, rich descriptions and explanations of processes in identifiable local contexts” (Miles & Huberman, 1994, p. 1). This study was primarily qualitative because in-depth understanding was required (Creswell, 2002). Qualitative research was chosen as the basis for this study because it has a greater emphasis on description (Wallen & Fraenkel, 2001) and allowed the researcher a holistic overview of the context that was being studied (Miles & Huberman, 1994). Qualitative research is research that generally occurs in a natural setting (Creswell, 2003), which in this instance was the classroom. Other characteristics of this qualitative research included it being “fundamentally interpretive” (Creswell, 2003, p. 182). The researcher was able to interpret the data making the research “emergent rather than tightly prefigured” (Creswell, 2003, p. 181). This meant that aspects of the study changed throughout; for example research questions changed and were refined during the period of the study (Creswell, 2003).

Qualitative research was appropriate for this study due to the nature of the research questions and the focus of the study. To ensure this study was thorough and systematic a variety of data collection methods were used. The main data sources were interviews with the teachers involved in the study and groups of six students from each class involved in the study. Qualitative data collection methods also included observations and note taking throughout the student interviews. A journal was completed by the student participants for the duration of the study.

Although this study primarily used a qualitative research paradigm it did also apply two quantitative data collection tools. These included a student questionnaire and teacher checklists. Although these data collection tools were quantitative in their nature, information was extracted and included in the qualitative data. That is, the data were analysed using qualitative techniques, which included using a qualitative software analysis program, NVivo. Although quantitative methods were used, the study was still primarily a qualitative study, supporting the notion that it is not a question of “whether a particular piece of research is or is not absolutely qualitative; rather it is an issue of degree” (Bogdan & Biklen, 1998, p. 4).

This case study methodology and its application to this study are described in detail in Section 3.4, which expands on how the study employed a qualitative research paradigm.

3.4 The Case Study

A case study approach was the most appropriate method of inquiry for this study because it provides a holistic view of the classroom. A case study can be defined as the study or detailed examination of a single individual or a single discrete social unit (Ary, Jacobs, & Razavieh, 1990). This study is a detailed examination of how teachers used the Internet to enhance their teaching and learning in the classroom. This definition of a case study is supported by Miles and Huberman’s definition where they define “a case as a

phenomenon of some sort occurring in a bounded context” (Miles & Huberman, 1994, p. 25). The bounded context for this study was the five individual classes, meaning this study had five individual and unique cases. Yin provides a broader definition, when he suggested that a case study “investigates a contemporary phenomenon within its real life context” (Yin, 2003, p. 13), in this case the study of Internet use in five real life classrooms.

By using case study methodology to focus “on process rather than outcome, on discovery rather than confirmation” (Burns, 2000, p. 460), this study was intended to gain an in-depth understanding of Internet use in the classroom. According to Stake (1995), it is important to maximise what information can be learnt by conducting a study and using case study methodology.

Case studies allow readers to judge the implications of the study for themselves as it is possible to recognise the complexity and “embeddedness of social truths” (Adelman, Jenkins, & Kemmis, 1983, p. 8) which other forms of research may not necessarily reveal. This methodology was also chosen because case studies “observe effects in real contexts” (Cohen, Manion, & Morrison, 2000, p. 181), with contexts being both unique and dynamic (Cohen et al., 2000).

Five primary classrooms formed the basis of this study. Schools and classes by their nature are different which means each case in this study is individual and unique. Each school and in turn each class is unique in its nature of having different students and teachers. Expanding on this, it was decided that each of the five classes comprised an individual case within a multi-case design. The advantage of using multiple cases is the depth of knowledge that can be achieved. Yin (2003) suggests that using multi-case design is increasingly common and multi-case studies can consist of multiple holistic cases (Yin, 2003). The use of multiple cases allowed for more compelling evidence (Merriam, 1998; Yin, 2003) to be gathered with single case designs possibly being vulnerable “because you will have put all your eggs in one basket” (Yin, 2003, p. 53). For this reason a multiple case design was chosen for this study. As this study has more than one case in a multi-case design it may generate more powerful conclusions than results coming from a single case (Yin, 2003). Merriam (1998), similarly suggests that with more cases in a study the interpretation is likely to be more compelling and show greater variation, which could enhance the findings.

This study is based upon the principles of naturalistic research and used qualitative research methodology in a multiple case study format. Although two of the data collection methods could be viewed as quantitative in nature, in this study they have been employed in a predominately qualitative manner, thus keeping the overall integrity of the research. It is important when describing the chosen methodology of the study to revisit the specific questions being investigated.

3.5 Statement of Research Questions Revisited

As stated in Chapter One, the following research questions and supporting questions were developed to guide this study.

The over-arching research question for the study is:

How is the Internet used to enhance teaching and learning activities in the primary school classroom?

The question was broken down into the following sub-questions:

1. How does the class teacher use the Internet to support teaching and learning in the primary school classroom?
2. How do students use the Internet both in school and in their everyday lives?
3. What impact does ICT availability have on the use of the Internet in the classroom?

3.5.1 Participants

Data were collected for the period of one New South Wales school term, which consisted of ten weeks, in Term 2, 2004. Several different schools were approached to be involved in the study to strengthen the multi-case methodology. Schools were chosen based on the following criteria:

1. proximity to the researcher;
2. students from a variety of socio-economic backgrounds; and,
3. willingness of a teacher and students in the school to participate in the study.

The schools were chosen through contacts previously established by the researcher, and four different schools were involved in the study with a total of five classes. Each class had between 25 and 30 students, with the majority of the students from each class involved in the project. The classes were ultimately chosen for several reasons, one being that the class was located in the primary section of the school, and another having a class teacher who would participate in the study. The researcher also needed to have access to the schools. To facilitate a deep understanding, the researcher gained data from both the class teacher and students in each of the five classes.

As shown in Figure 3.1, two schools were located in South Western Sydney and two schools were in Wollongong. The schools selected displayed differences in terms of:

1. socio-economic backgrounds of the students;
2. location; and,
3. practice of using computers and the Internet at the school.

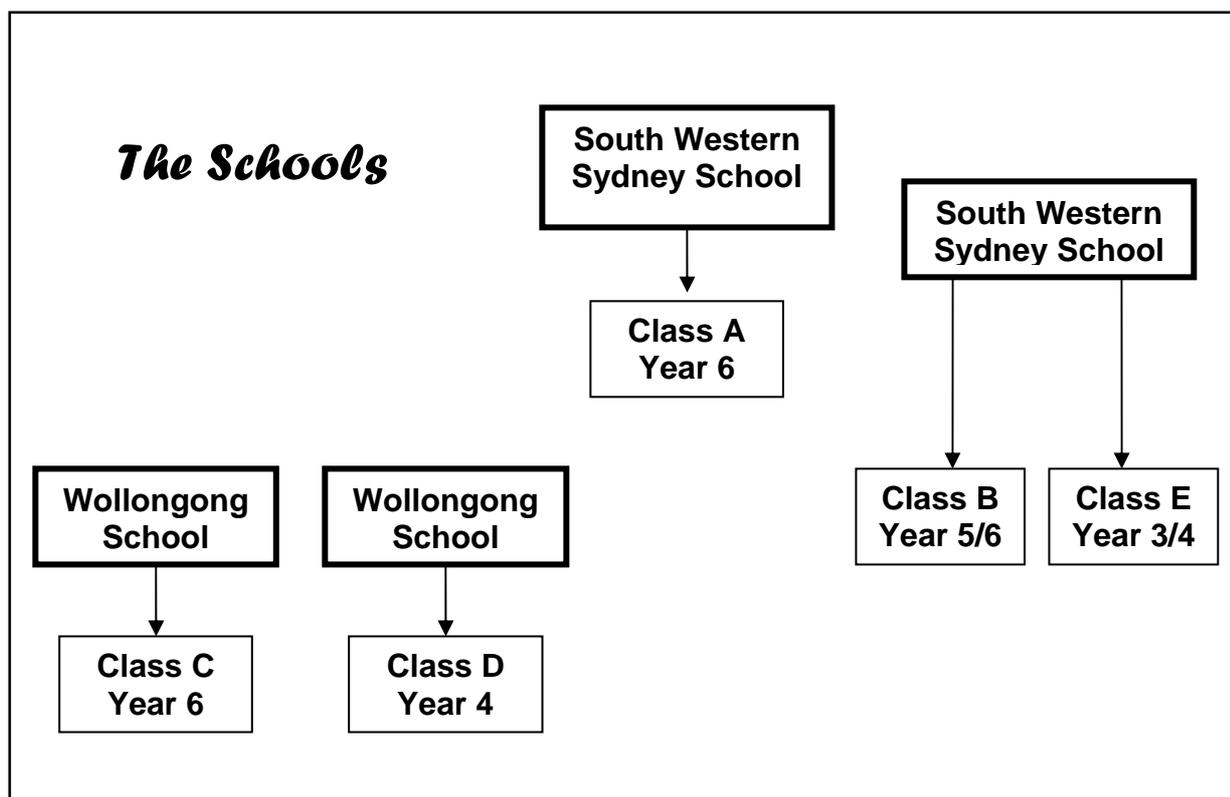


Figure 3.1 Outline of schools participating in the study.

The two schools located in South Western Sydney could be described as being quite different to the Wollongong schools. The Australian Bureau of Statistics has developed Socio-Economic Indexes for Areas (SIEFA) and using data from the most recent census in 2001 it is possible to determine, amongst other factors, the level of disadvantage for a particular area.

Table 3.1 shows the advantage/disadvantage for the areas each case is located in. The lower the number, the greater the disadvantage of the area in which the school is located.

Table 3.1 Measures of advantage/disadvantage for the areas surrounding each of the schools participating in the study.

State Average	Case A	Case B	Case C	Case D	Case E
1011	944.64	1001.2	868.24	885.44	1001.2

The advantage and disadvantage figure was calculated by the Bureau of Statistics by taking into account variables such as education, income and occupation as well as living conditions, wealth and access to services. Using this SIEFA data created from the 2001 census it was quite apparent that the schools in South Western Sydney having SEIFAs of 944.64 and 1001.2 for Advantage/Disadvantage were below average, while the Wollongong schools were even lower with SIEFAs of 885.44 and 868.24 and in approximately the lowest 10% of the state for Advantage/Disadvantage. The state average for this census was 1011.

The classes from South Western Sydney chosen for this study were a Year 6 class from one school, with a Year 5/6 composite class and a Year 3/4 composite class from the other school. Composite classes have students from two different year levels. For example, the 3/4 composite class contained students from both Years 3 and Years 4. There were nine Year 3 students in the class, and 17 Year 4 students.

The Wollongong schools, identified as low socio-economic schools, received additional money as part of the Priority Schools Funding Program (PSFP) from the New South Wales Department of Education and Training. The Wollongong cases consisted of one Year 6 class and a Year 4 class from each school.

3.6 Number of Participants in the Study

As participation in the study was voluntary the number of journals and surveys completed by the students varied for each class. This occurred for different reasons, one being that classes are fluid in nature; for example, a child may have been absent from school the day the survey was conducted. Occasionally a child left the school during the data collection period causing their withdrawal from the study. All students in each of the classes were invited to participate and informed consent was given by the students and their parents. Table 3.2 shows the number of surveys and journals completed for each class.

Table 3.2 E-learning journals and surveys completed by the participants in the study.

Class	Number of students in class	Number of participants in study	Number of journals collected	Number of surveys collected
Class A	28	23	23	23
Class B	26	20	20	20
Class C	27	25	25	24
Class D	23	21	21	20
Class E	26	26	26	18

Three of the cases described involved students in Year 6 classes at the time of the data collection. During this time the students participated in a state wide computer skills test. The pencil and paper component of the test was completed by all public school students on May 5th, 2004. The online component of this test was completed by students during a three week period between May 24th and June 11th. The timeframe allowed schools to have flexibility in accommodating all students in Year 6. The test was designed to discover and record student knowledge of “computer-based technologies to locate, access, evaluate, manipulate, create, store and retrieve information; communicate with others using computer-based technologies; and discriminate in the choice and use of computer-based technologies for a given purpose” (New South Wales Department of Education and Training, 2004, p. 4). Results from the test were not used as part of the data for this study, as it was not released during the data collection period.

3.7 Instruments of Data Collection

Each class teacher was interviewed twice, once at the beginning and once at the end of the data collection period. Class teachers also completed an optional Teacher Checklist, which is located in Appendix B. Certain students participated in focus group interviews at the beginning and end of the data collection period. Each participating student in each class also kept an e-learning journal weekly for the duration of the term and completed a questionnaire at the end of the term. This e-learning journal is located in Appendix A. These data collection tools are described in detail below.

3.7.1 Interviews

Both the teacher and student interviews were semi-structured while the student interviews occurred in a focus group format. According to Creswell (2002, p. 206) the focus group format “is the process of collecting data through interviews with a group of people”. Focus group interviews for the students were chosen for several reasons with the main reason being that the students were young and they may have felt uncomfortable being interviewed individually and that group interviews may be less intimidating for children than individual interviews (Cohen et al., 2000). Importantly “focus groups provide insight and attitudes that underlie behaviour” (Carey, 1994, p. 225). An important reason was that focus groups provided in-depth information that was gathered in a short period of time (Johnson & Christensen, 2004). Conducting focus groups meant that a wide range of students could be interviewed within the time constraints. Also, data collected from the focus groups could also be more informative than other data (Carey, 1994), because such interviews provided for more detail to be gained depending on individual student responses.

Teacher interviews were also an important data collection method with a semi structured range of questions being asked. This was because structured ‘teacher interviews’ would have allowed for little variation of the responses (Fontana & Frey, 2000), while semi structured interviews allowed leeway for the teachers when answering open ended questions. They also allow the interviewer to ask clarifying questions where necessary. As a consequence this study thus used semi structured interviews for both the initial and final teacher interviews.

Both the student and teacher interviews were recorded using a handheld Pocket PC which was a small device that was an electronic audio recorder as well as an electronic organiser. This computer recorded the interviews as audio wave (.wav) files and these were uploaded to the computer. A software program which was available from the Internet as a free download called Express Scribe was used along with a USB connecting foot pedal to transcribe the interviews. Express Scribe worked in the same way as a traditional transcribing machine, but allowed all data to be kept electronically as document (.doc) files.

3.7.1.1 Teacher Interviews

Each of the class teachers were interviewed to enable data gathering concerning teacher’s implementation and choice of resources related to the use of the Internet. This occurred at the beginning of the school Term 2 and again at the end of Term 2. The interviews were semi structured and the teachers were given the choice of bringing their teaching and learning program along to the initial interview if they wished. The class teachers were also encouraged to bring along a completed checklist regarding class Internet use to the final interview. The semi structured interview questions are listed below:

Initial Teacher Interview

- How long have you been teaching?
- In general, how long have you been integrating technology into your lessons?
- Tell me about the units of work you are teaching this term?
- What types of Internet resources are you using with the units of work?
- Where do you get those resources from?
- How are you integrating Internet resources into your lessons?
- Have the children used these kinds of Internet resources before?

Final Teacher Interview

- How have you been using the Internet as part of your class activities?
- Is this in a different way than you initially thought?
- Has this changed during the term?
- Have you received any training and development with regard to information technology this term? If so, what?
- How has this training and development helped you?

3.7.1.2 Student Interviews

A focus group format was used for the student interviews, as described in Section 3.7.1.1. Approximately six students from each class were selected to participate in each focus group interview. The students were chosen by the teacher and had parental permission to participate. Again there was one interview with each group at the beginning of Term 2 and one at the end of the term. Students were interviewed twice so that more in-depth data could be gathered. In order to gather a variety of data the interviews were quite different from each other. They are described in detail below.

Following the process developed for this study at the initial interview, the students paired up as agreed and interviewed each other. The students were given a card that contained focus questions for reference and as a guide for the students. These questions included the students asking each other how they feel about using the Internet, what they like using the Internet for and how they would like to use the Internet in the future. The students were encouraged to find out if their partner had the Internet at home and if they were allowed to use it. They were also asked to find out any other information regarding Internet usage they could. During this time the researcher observed the students working together, took field notes of her observations and answered students' questions. After the students interviewed each other, they then reported back to the group on the information they discovered about their partner. This was also recorded.

The final interview was held at the end of the school term with the students paired up once more. Some focus groups kept the same pairs of students but others chose to change partners. This time the students were asked to design an activity that their class would be able to do using the Internet. The students were given the option of relating it to a unit of work they had been studying or were perhaps going to study in the future. The students were given note paper and were able to write notes if they wished. Again the researcher observed the students, answered their questions and took field notes. The students then presented their ideas to the rest of the group. Finally, the researcher facilitated a discussion amongst the students about how they had been using the Internet in class during the past term. They also discussed any problems they had encountered.

As mentioned above, while the students worked in pairs they were observed by the researcher who took field notes. This allowed the researcher to observe in the group setting and particularly to observe and record behaviour, such as the dynamics of each pair. This was naturalistic observation and played an important part in the study by possibly indicating differences between stated attitudes and actual behaviour (Johnson & Christensen, 2004). This observation was another form of data collected as it was important to observe the dynamics of each pair to ensure the views of both students involved were given and not just one.

3.7.2 Questionnaire

A questionnaire which is located in Appendix C, was developed to gather additional information as well as for triangulation purposes. The questionnaire was designed to ask students questions that were different to those posed by the e-learning journal so that further more detailed information could be obtained. This was designed to complement the information obtained elsewhere throughout the study. It was given to all participating students in order to allow them to express their views on using the Internet in class. Each school was visited during Week 10 of term and the students completed the questionnaire during this time. The questionnaire allowed for data to be collected on student perceptions of using the Internet and Internet resources during class time and asked whether the students used the Internet at home for school work and whether they preferred to use the Internet at home or at school. The questionnaire asked students what they learnt during school time and whether they had learnt new skills during the term.

The questionnaire included both closed and open ended questions. Questions were structured so that first a closed question was asked, such as "Where would you prefer to use the Internet?", with students having a choice of ticking the box to answer either home or school. These closed questions allowed for quantitative data to be collated with students choosing "from a limited number of responses predetermined by the researcher" (Johnson & Christensen, 2004, p. 168). An advantage of using closed questions prior to open ended questions to gather this type of data is that it was perhaps possible to discover the reasons behind a certain answer (Creswell, 2005).

After each closed question there was an open ended question that required an explanation to be provided. Having open ended questions in the questionnaire allowed "participants to respond in any way that they please" (Johnson & Christensen, 2004, p. 168) with questions mostly open ended to allow for discovering any "gems" of information that otherwise might not have been caught in the questionnaire" (Cohen et al., 2000, p. 255). Open ended questions provided rich information with the researcher gaining insight into what the participants were thinking (Johnson & Christensen, 2004).

3.7.3 E-learning Journals

Journaling has been defined "as the act of keeping a journal for reflection" (Collay, Dunlap, Enloe, & Gagnon, 1998, p. 72). The e-learning journal allowed for data to be collected on how the students were using the Internet in class as well as allowing the students to indicate the types of Internet resources they were using both at home and at school.

The students completed their e-learning journal each week. This journal can be found in Appendix A. This was a printed booklet each student participating in the study was given. It was kept from Week 2 until Week 10 of the term. The e-learning journal as a data collection instrument was piloted with two classes in 2003. This was to ensure that

students were able to complete the journal and that the focus questions were not too difficult for the students to answer. There was careful piloting in this study because when using journals as a data collection instrument, it is necessary to ensure that they are completed in the correct manner (Hinds, 2000).

One advantage of using documents as a data collection tool is that the participants use their own words, which was one of the reasons a journal was used here (Creswell, 2002). There were also several other possible benefits of journal writing, as Loo & Thorpe (2002) report. While not specifically discussing children, they reported that adults who keep learning journals generally find the experience a positive one with an improved ability to reflect. Furthermore, journaling “meets many of the criteria for enabling students to become independent learners” (Shulman, McCormack, Luechauer, & Shulman, 1993, p. 100).

Some of the disadvantages of using journals as a data collection tool include the fact that there is a large responsibility on the participant to complete the journal. There are also problems with self recording, such as illegible writing, students not completing correctly, and issues with the time required for diary completion (Hinds, 2000). These were minimised here by discussing with the students in each class how to complete the journal as well as discussing with the class teacher how long it should take each week.

Students were able to complete the double page of the diary once a week, generally towards the end of the week on a Thursday or a Friday. Figure 3.2 shows an example of a completed e-learning journal.

Term 2, Week 7, 2004		Term 2, Week 8, 2004																																															
<p>Focus Questions</p> <p>1. How have you used the Internet in the past week?</p> <p>2. Did you use the Internet in a different way than you usually do? How?</p> <p>Please record any thoughts you wish to share about using your account.</p> <p>We were on captia cook and it was a little hard I really enjoyed it. We had to save it and when we did I had to click on the four squares in a box and she lost all of our work. I had to thing saved on it but then I had to lost it all. At home I went on to Delta gooden.</p>		<p>Questions</p> <p>1. How many times did you use the Internet in the past week? (Please tick)</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">At School</th> <th colspan="2">At Home</th> </tr> <tr> <th>School Use</th> <th>Personal Use</th> <th>School Use</th> <th>Personal Use</th> </tr> </thead> <tbody> <tr> <td>Saturday</td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Sunday</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Monday</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Tuesday</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Wednesday</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Thursday</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Friday</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Somewhere else? _____ Where? _____</p> <p>2. If you used the Internet at school, generally what time of the day did you use it?</p> <p>Before school <input type="checkbox"/> Morning session <input checked="" type="checkbox"/></p> <p>During lunch <input type="checkbox"/> Middle session <input type="checkbox"/></p> <p>During recess <input type="checkbox"/> Afternoon session <input type="checkbox"/></p> <p>Straight after school <input type="checkbox"/></p> <p>3. Did you use the Internet to:</p> <p>Email <input type="checkbox"/> Who? (Eg. A friend, teacher, parent) _____</p> <p>Discussion board <input type="checkbox"/></p> <p>Visit School site <input type="checkbox"/></p> <p>Go to other websites <input checked="" type="checkbox"/></p> <p>If so, what types of website? _____</p> <p>Search the Internet <input type="checkbox"/></p> <p>If so, what search engine? _____</p> <p>Chat with friends online <input type="checkbox"/></p> <p>If so, what did you use? _____</p> <p>Other <input type="checkbox"/></p> <p>Please list _____</p>					At School		At Home		School Use	Personal Use	School Use	Personal Use	Saturday				✓	Sunday					Monday					Tuesday					Wednesday					Thursday	✓				Friday				
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Figure 3.2 Excerpt from a completed e-learning journal.

The e-learning journal required the students to answer questions on how they used the Internet and whether their Internet usage was school related or personal. They were also able to tick how they used the Internet and if they used the Internet in a different way than usual and what search engine, if any, they used to ‘search’ the Internet. The students

were given several lines in which they could write their thoughts or answer the focus questions. The focus questions in the journal were:

- How have you used the Internet in the past week?
- Did you use the Internet in a different way than you usually do? How?

3.7.4 Teacher Checklist

The teachers were also given a checklist (Figure 3.3) at the beginning of the study, which allowed them to check off how often and how they used the Internet with their class each week. The checklist was designed to be completed throughout the term and was perused by the teacher during the week. The researcher suggested that the checklist be brought to the final interview and used as a prompt for both the researcher and the class teacher. Two teachers took up the option of completing the checklist and bringing it to the final interview.

Internet Use Survey					
3 May – 7 May					
	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Used Internet? Y/N No. minutes _____ How used?				
Mid-session	Used Internet? Y/N No. minutes _____ How used?				
After lunch	Used Internet? Y/N No. minutes _____ How used?				

Figure 3.3 Teacher's checklist for Internet use.

3.8 Ethics Approval

One of the main ethical considerations in this research study was obtaining informed consent of the participants in the study. The principle of informed consent arises "from the subject's right to freedom and self-determination" (Cohen et al., 2000, p. 51). In this study all participants, teachers and students, were required to give informed consent to participate in the study. This involved ensuring that each participant knew they had a choice of whether they wished to "participate in the research and that they know they have the right to withdraw from the research at any time" (Greig & Taylor, 1999, p. 149). The participants also had a right to privacy which required "protecting the identity of the subject" (Fontana & Frey, 1994, p. 372). All participants in this study have been given an alias.

Participants also needed to know their exact role in the research (Greig & Taylor, 1999) and were treated with respect at all times (Bogdan & Biklen, 1998). As children perceive and understand their world differently than adults do it is important that students were treated as "developing and growing beings who have their own specific characteristics" (Greig & Taylor, 1999, p. 156) and not as adults.

Confidentiality was ensured as well as anonymity. Both verbal and written information gathered was anonymous (Bogdan and Biklen, 1998), and participants were able to withdraw from the study at any time.

Ethics approval was sought and given by both the University of Wollongong and the NSW Department of Education. Appendix E contains copies of the consent forms and information sheets.

3.9 Data Analysis

After data collection, the data were firstly organised and then transcribed as described earlier in this chapter. The data were then coded and analysed on the basis of themes which emerged from the e-learning journals, questionnaires and interviews.

The comments page from the e-learning journals was transcribed into a Microsoft Word file. One file was created for each class with a heading for each week. Information that looked at a student's pattern of use was entered into a Microsoft Excel file. One Excel file was created for each school and in the file there was one worksheet for each week of the school term.

The questionnaire responses were entered directly into a Microsoft Word file with a file created for each class. All responses from each student were placed under each question from the questionnaire. The interviews, student interview notes and researcher's notes were also transcribed directly into Microsoft Word.

3.9.1 Approach to Analysis

As this study used a qualitative research framework, the data were analysed by "examining, categorising, tabulating, testing" (Yin, 2003, p. 109) the data. This was completed in the ways described below.

After all data were transcribed the student comments from the e-learning journals, notes and interviews were placed into a data analysis software program called QSR NVivo. This program facilitated organising and managing the data and provided a searching tool (Creswell, 2002, p. 261) for this research. NVivo also allowed the researcher to manage text data that were often unstructured, assisting with the "processes of indexing, searching, and theorising" (Creswell, 2005, p. 237) and helping the researcher to "examine features and relationships in texts" (Gibbs, 2002, p. 11).

After transcription there was a preliminary exploration of the data which allowed the researcher to become familiar with them and then create memos containing any ideas that were formulated (Creswell, 2002). The data were then coded, which was "the process of segmenting and labelling text to form descriptions and broad themes in the data" (Creswell, 2002, p. 266). New ideas emerging from the data were noted. The data were then looked at in terms of answering the research questions with themes being developed by looking at the codes that the students most frequently discussed (Creswell, 2005). These themes were refined during the analysis of the data with the data being linked by "recognising substantive rather than formal relations between things" (Dey, 1998, p. 152).

3.9.2 Analysing the Individual Cases

The cases were analysed and reported one at a time. This process was facilitated through the use of NVivo by using the case node. This allowed for all text related to each case to be grouped together to allow for searches within each particular case.

3.9.3 Assessing the Quality of the Study

As this study is primarily qualitative it is important for the researcher to be aware of researcher bias. This has been overcome by actively using reflexivity, which consists of engaging in self reflection about any potential predispositions and biases (Johnson & Christensen, 2004).

3.9.3.1 Validating the Accuracy of the Findings

As with any study using a naturalistic paradigm trustworthiness of the study is an important consideration. As Guba and Lincoln (1999), state that this is important to contribute to the meaningfulness of the study.

Validity does not have the connotations in qualitative research as quantitative research as it is used to determine whether the findings are accurate from the standpoint of the research (Creswell, 2003). Creswell (2003) states there are eight primary strategies to ensure validity and trustworthiness of qualitative research. Five strategies deemed appropriate and used in this study are described in Table 3.3 below.

Table 3.3 Strategies used to ensure validity (based on Creswell, 2003)

Primary strategies used to ensure validity and trustworthiness	The ways this study has addressed these strategies
Triangulation “Different data sources of information by examining evidence from the sources and using it to build a coherent justification for themes” (Creswell, 2003, p. 196).	In this study both teachers and students were participants and multiple sources of data were collected from each group, thus ensuring triangulation, which allowed the researcher to use the data “to build a coherent justification for themes” (Creswell, 2003, p. 196).
Rich Thick Descriptions Are used “to convey the findings. This may transport readers to the setting and give the discussion an element of shared experiences” (Creswell, 2003, p. 196).	There are rich thick descriptions located throughout the book. This is due to the richness of the data collected throughout the period of data collection and extensive use of direct quotes to illustrate the interpretations.
Researcher Bias Creswell (2003) suggests clarifying any bias the researcher brings to the study.	The researcher worked at one of the schools where the data was collected, thus potentially creating some researcher bias. This has been stated in the book and data at that school was collected in the same way as at other schools where there is no relationship with the researcher. The researcher was also careful to examine her assumptions about the schools that might be influenced by her prior experience as a teacher in the New South Wales public school system.

<p>Prolonged Time Creswell (2003) states the importance of spending prolonged time in the field to develop an in-depth understanding of the phenomenon being studied.</p>	<p>The data collection for this study was conducted over a sustained period of time – one school term of ten weeks during which each school was visited on multiple occasions.</p>
<p>Member Checking Is used to “determine the accuracy of the qualitative findings through taking the final report” (Creswell, 2003, p. 196) back to the participants.</p>	<p>This study used member checking with the teachers after the teacher interviews. Each teacher was given a transcript of the interview to check for accuracy of transcription.</p>

Validity in this study was ensured by careful development of the data collection strategies. This study attempted to ensure validity by using various data sources allowing for greater triangulation of the findings, to provide corroborating evidence (Creswell, 2005).

The student e-learning journal was also piloted prior to use with a typical cohort of students to ensure its reliability. Small modifications of the nature of the questions asked were then made to this instrument for the data collection phase of this study. Piloting the e-learning journal also ensured that students would find the time in class to complete as well as complete it in meaningful ways. This pilot testing suggested the instrument was reliable because the instrument could be used to achieve consistent results.

3.10 Conclusion

This chapter has presented the methodology applied in this study. The study used a qualitative case study approach which allowed an in-depth investigation of Internet use in primary classes and a naturalistic paradigm within the case study approach. The participants in this study have been described as well as the sources of data and how the data were analysed. The next chapter will present an analysis of the data that were collected.

Chapter Four

The Cases

4.1 Introduction

The results of each case studied will be described in the five sections of this chapter. Each account will begin with general information about the school and the class and will then describe the specific findings of each case. Each case will have a summary of the results to conclude and at the end of the chapter the overarching themes will be described. As stated in Chapter 3, for confidentiality reasons, any identifying descriptions have been removed from individual cases. Each class has thus been given a name, that is: 'Class' and a letter from A to E as a way of distinguishing between the classes, for example, 'Class A' or 'Class C'.

As described in Chapter Three, data were collected throughout the entire school term during Term 2, 2004, from a variety of sources, including the class teacher and students in each class. Teachers and students completed an e-learning journal each week throughout the school term. As well, the students completed a 'student questionnaire' at the end of the term. Six students from each class were also involved in a focus group interview. One teacher from the school was also interviewed at the beginning and end of the school term. Generally, the class teacher was interviewed but at one school the interviews were with the teacher responsible for teaching computers within the school. This provided an opportunity for further data collection as it was this teacher who was responsible for implementing the program in Information and Communication Technology (ICT) at that particular school. In New South Wales, one common way for students to learn in the area of Information and Communication Technology is through a specialist computer teacher. Generally the specialist teacher will take each class in the school for approximately one hour per week although often students engage in additional computer experiences with their class teacher.

4.2 Case 1: Class A

4.2.1 Background

Class A was a Year 6 class at a school in the south western Sydney region. At the time of the study, this school had an enrolment of 400 students with 195 boys and 205 girls. The school had 14 mainstream classes and 4 support classes for students with mild and moderate learning difficulties. According to the school statistics there were 137 students in the school who were from a cultural heritage other than English and 11 students in the school identified as Aboriginal.

Of the 28 students in Class A, 23 participated in the study by completing the e-learning journals and the questionnaires. Six of these students also participated in the focus group interviews at the beginning and end of the data collection period. The students began completing the e-learning journal at the beginning of the second week of term. The

students were encouraged to comment in their e-learning journal at any time during the term, resulting in some students making more comments than others.

This case will be described, firstly using data gained from the class teacher and then using data from the students.

The class teacher, Glenn, stated that at the time of the data collection that he had graduated from his teacher education course in 1993 and was in his eleventh year of teaching. He was responsible for teaching a Year 6 class during the period of data collection and was also the Assistant Principal of the school. Glenn stated that he had been integrating technology into his class lessons for about ten years.

Glenn felt he had not received any formal professional development in the area of teaching with ICT from his school “ever, except for myself going to uni”. Glenn had returned to university to complete a Master of Education majoring in Educational Technology, which he completed in 1996. Glenn was trained as the district ‘Technology in Learning and Teaching’ (TILT) advisor in 1997, which entailed two days training. This professional training was completed at a state level and Glenn was the only teacher at his school to receive this training. Glenn commented specifically on the lack of ICT training he had received since he had been a teacher and that it had been ‘outdated’.

Glenn said that there was a school computer laboratory integrated with and used as part of the class library time. Glenn’s class used these computers at this time for up to one hour per week. Glenn’s classroom also had two computers located within the classroom specifically for student use. These computers were mainly used during class time for individual students to complete any unfinished work. Glenn commented that there were time constraints which hampered learning, not allowing all students use of the two computers in the classroom, and as a result not all students were getting what he felt was ‘adequate time on the computers’. The school also had a mobile laboratory of fifteen laptops which could be borrowed by any class and used in the regular classroom. The laptops had access to the school’s wireless network which was connected to the NSW Department of Education and Training’s (DET) network with Internet access. During Term 2, the students used the class set of laptop computers as a whole class activity on both Tuesday and Friday. The students used the computers in the middle session, between recess and lunch, on these days for up to two hours per time. As well, there was also scattered computer use during the rest of the week with at least two students using the two class computers periodically each day.

Glenn believed it was much easier to integrate technology skills into the class’ teaching and learning program by using the class set of laptops as opposed to the two computers that were located at the side of each classroom. It appears that the class set of laptops may have allowed for greater access by a larger number of students.

Glenn made some significant comments about the teachers’ use of computers at the school:

The teachers are getting more and more comfortable using them [the laptops] because all the teachers have trouble managing a class with only two computers. And the equity, and the rotating and the missing out of work while they are on the computer. And the catching up, so by having a class set one between two they feel they can integrate it better because it’s a computer lesson but they are integrating what they are doing.

4.2.2 ICT Topic for the Term

During the time of the study Glenn taught a unit on Democracy which was located within one of the New South Wales key learning areas: *Human Society and its Environment* (HSIE). He stated he had chosen to teach about some of the significant people that have influenced democracy in Australia. After being told about the topic the students were asked to use the Internet to research a significant person. The task required the students to find “a picture of the individual from the Internet and they had to do research [on] four individuals each”. The students then completed a PowerPoint™ presentation based on a significant figure which they presented to the class at the end of the term.

According to Glenn, the class activity involving the ICT unit integrated well with the HSIE syllabus. Glenn commented in relation to the unit, “the purpose of this [task] is to teach them to search [the Internet]”. Glenn decided not to provide any scaffolding to the children, such as preselecting or providing the children with a number of useful sites. He stated:

We mainly use Google. And I guess we get good results, the kids are comfortable using it and I can integrate my image searches at the same time. So I just find Google the best all round tool for kids. Not that it is the best but I find it the best.

Glenn expanded on the activity developed for the students by stating:

They use the search and then where they go to the website based on what I've taught them to use the little description to read the first part. So the kids will go to it, read the beginning, first paragraph usually, if it's not what they want they go back and try the next one.

It is interesting to note the way the students handled this searching activity. As can be seen from the quote above, the students had previously been taught to use the *little description* found in Google and if the website seemed suitable then the students would click on the link and go to the website to seek further information. The students would then read the beginning paragraph and if the website was not what they were looking for they would click on the back button and try the next website. Glenn believed that this was an important skill that specifically needed to be taught to the students.

According to Glenn the students had not previously been involved with much Internet searching, although he “wouldn't say they are novices, [but] they are fairly rudimentary”. Although the teacher made this comment reflecting his previous experience within his class, in contrast many students stated a greater familiarity with this skill, often stating in their e-learning journals that they generally searched with Google.

4.2.3 Types of Internet Use

As described in Section 3.6.3, the students kept a record of how they used the Internet at school by completing their e-learning journals each week. The students were given the journals during the first week of the school term and were able to complete them between Weeks 2 to 10.

Student responses indicate a wide range of uses of the Internet during the period of data collection. These include using the Internet to search for information, games, research, using email or MSN, going to recreational and educational sites, as well as downloading

and completing the state wide computer skills test. The types of Internet use by students, is shown in Table 4.4 as well as the number of students who recorded the comments, the total number of comments and the percentage of comments recorded in the e-learning journals.

Table 4.4 The types of Internet use, the number of students who commented and the total number of comments that occurred throughout the study by students in Class A.

Types of Internet Use	Number of Students who Commented	Total Number of Comments	Percentage (%) of Comments
Searching	6	6	4.3%
Games	13	24	17.1%
Research	17	45	32.2%
Email & MSN	4	15	10.7%
Educational sites	1	1	0.7%
Recreational sites	9	16	11.5%
Downloading	9	24	17.1%
Computer Skills Test	8	9	6.4%
Total	-	140	100%

Interestingly, one hundred and forty comments were made by the children throughout the school term with 32% of the student comments referring to research. As such, this was the most referred to Internet use. Downloading and games were identified as the next most frequent uses of the Internet with 17% of comments on each of these areas. Accessing recreational websites accounted for 11.5% of student comments while 10.7% of comments were for communicating with email and MSN. The computer skills test accounted for only 6.4% of comments made by the students while searching accounted for a mere 4.3% of total comments. Interestingly, there was only one comment pertaining to accessing educational websites, which was with regards to a visit to Canberra.

It appears that students used the Internet predominantly for research with 45 comments being recorded. However, it is important to note only 17 students from the class made these comments. Many students commented on using the Internet to “look up famous Australians”. A variety of topics were searched by the students, including rainforest animals and human rights, which were additional tasks assigned to the class for investigation by the teacher throughout the period of the study.

Accessing games websites accounted for 24 comments by 13 different students and these included the students stating during the week they were “playing online games” and playing “games to have fun”. Students sometimes even elaborated, giving the name of the online game they played; for example, “games called Bug on a Wire and NYPD Blue” or “I played games such as Stick Death, Create a Ride”. Some students included the name of the games website they visited in their journal; for example, accessing sites such as “Pokemon, cheatindex”, and “gameaone”. The greatest number of student comments concerning playing online games occurred during Week 9 of the school term. Perhaps, as

this was near the end of the term, the students may have been given some less structured time on the computers.

Nine students recorded using the Internet to download material 24 times during the school term. According to the student's e-learning journals many commented that they downloaded pictures. This occurred across the school term. Sometimes students commented they did this more than once and occasionally students downloaded more than one thing during that week. An example of this use was shown in a comment made in Week 9:

I have used the Internet in the past week by downloading lyrics and images for screen savers. [I] save it onto Microsoft Word™ and using [sic] it as wall paper.

Several students said they found images to use as screen savers while others commented that they downloaded pictures and music regularly.

Of interest is that only one student noted accessing an educational website. This use was to "look at clips from the Canberra trip". However, many students commented on going to recreational sites, with nine students making a total of 16 comments. Students made other comments such as "went on girl websites" and "did girl stuff" or "went looking for cars". One student recorded that he "listened to phone tones on the Internet".

A total of nearly 11% of student comments were pertaining to email and MSN. In their e-learning journals four students made a total of 15 comments on using email and MSN. These comments included communicating with people, more specifically talking to family members and chatting "to my friends and cousins".

Email appeared to have been used throughout the school term by some students. The students were able to record email use in a specific check box located in their e-learning journals. This information could be recorded a maximum of once per week in their journals. There were nine Class A students who recorded using email throughout the school term. As the NSW DET did not have email accounts for students these were private email accounts. One student recorded emailing friends in eight weeks of the school term while another student emailed friends in seven different weeks. The other seven students only recorded using email either once or twice throughout the school term. One student recorded emailing a parent, while three students stated they emailed "cousins and friends".

It is interesting that during the focus group interviews students in relation to email usage, often used the terms 'talking to' instead of 'communicating with'. An example of this from one student was "talking to family and all that. And grandparents". Another student commented on "using the Internet for projects and getting into groups on the Internet and talk to each other by Internet". Students also mentioned communicating with friends on MSN messenger.

Students also commented on how they searched for information. The students stated that they used Google and that they generally searched for topics, such as cars. The students were given a choice of which search engine they used but previously the class teacher had taught the students to use the Google search engine. One student commented that he used the Internet to search for images. While generic comments were common, one student described specifically how he went to the search engine by stating, "I just type Iprimus, [and] then click Internet Explorer, then type in Google".

While comments on the topic of searching only accounted for 4.3% of all recorded comments, the students were also able to record their use of searching the Internet by completing another check box section in their e-learning journals. They were then able to record information regarding their use of search engines, indicating which search engine they used each week thus showing a large result for the term. This is depicted in Table 4.5, which shows the range of search engines the students used throughout the data collection period. This table demonstrated that the preponderance of students used Google as a preference to search the Internet. The other student choices for search engines were Ask Jeeves, Yahoo and another called ibanana. Some students appear to have been confused by this area and included topics such as “human rights”, not an actual search engine.

Table 4.5 Number and percentage of Class A student uses of various search engines.

	Google	ibanana	Ask Jeeves	Yahoo	Other	Total
Total Uses	62	5	2	2	2	73
Percent (%)	85%	6.9%	2.7%	2.7%	2.7%	100%

During the school term the NSW Department of Education and Training conducted a state wide mandatory Year 6 computer skills test. As all students participated in the test it is surprising only eight students commented on this. The test was both a pencil and paper and online standardised test which was administered at the beginning of the school term.

4.3 Home and School Internet Use

In the questionnaire administered in this study, the students were asked whether they used the Internet more at home or at school. Eleven students reported using the Internet more at home while 12 students used it more at school. When asked where they would prefer to use the Internet 13 stated at home while 10 stated at school. The students' reasons for their preference varied. Two students commented that they preferred to use the computers at school because they received teacher support at school with one student stating, “if you need help you can ask your teacher but if you need help at home your parents might not know”. Another student commented that the Internet at home was ‘dial up’, perhaps suggesting the school broadband is faster. One student felt he accessed more time on the computers at school while yet another student likes using the school computers because he has “learnt how to use the computers at school”.

Some students preferred to use the Internet at home, with four students stating that this was because their home environment was quieter, while three students felt they could “do more personal things”. Five students felt that at home they had no time limit on the computers and the computer was available at anytime. One student liked to be able to play racing games and “Stick Death where it is not appropriate at school”.

The questionnaire asked the students if when they were at home they used the Internet in different ways. Eleven students in the class stated they did use the Internet in different ways at home while twelve students did not. Students using it in different ways commented on playing different games than at school, chatting and emailing friends and using the Internet for downloading with one student stating she uses the Internet to “copy lyrics and pictures into Microsoft Word™”. Other students felt that they could access different websites than at school with one student stating he likes to “look up things I’m interested in at home”.

Student responses in the check box section of their e-learning journals indicated that 89% used the Internet at home for personal reasons with the remainder indicating their use was for academic reasons. Generally, students used the Internet at home for academic use to look up topics such as “famous Australians”. One student made a specific comment that she “used the Internet to get images and information on famous people”.

The students were asked if they used the Internet at home to assist with school work in the questionnaire. There were 15 students who stated that they did while 8 did not. The students who used the Internet at home did so in order to complete their homework or do assigned research. One student expanded and stated, “I get my dad to help me look it up for my homework”. Some students did Google searches while one student stated “I use the Internet for researching more things I don’t know”.

4.3.1 Limitations to Student Use of Technology

From examination of the data collected it appears that students faced some limitations in their ability to utilise the Internet. These limitations were grouped into the following categories: using the Internet; technical problems; and student competence. These limitations were discussed with the students during the second focus group interview which was conducted at the end of the school term.

The students commented on some of the technical problems they encountered during the term by saying “the Internet actually played up”. In fact this was verified as the NSW Department of Education and Training had blocked all Internet access for all schools across the state for several days.

Student level of competence was highlighted as a problem with one student stating:

Like we got, the information that we got there it was really hard for us to find, that’s why we decided on that. That’s, it was really hard to find, and put it together so that’s why we said that.

This student was describing how difficult it was to get information on their chosen topic for a group task. The student was describing that group’s rationale for what they would like to do next term in computers, to create a web page instructing other students on how to more easily complete the tasks they had completed this term.

Although not a problem directly affecting all the students, one student felt compelled to comment that when a relative used the Internet she had experienced a problem. The student stated:

It happened to my cousin, she gave a person her email address and they kind of snuck into it and they sent rude messages to everybody.

4.3.2 Student Perceptions on New Skills Learnt

In the questionnaire, the students were asked if they felt they had learnt anything new when using the Internet at school. Seven students stated that they thought they had learnt new skills. A collection of student comments on 'new skills learnt' included:

- how to set a picture on the page;
- how to use more menus;
- we learnt how to make a graph;
- I learnt doing graphs doing a whole heap of stuff;
- drag pictures and put them on PowerPoint™;
- I learnt how to do a graph;
- about refugees and immigrants, rainforest;
- about how to play the games.

It appeared that some of the new knowledge the students felt they had learnt was not in relation to the use of the Internet but in general computing skills such as using menus, creating graphs and inserting pictures into PowerPoint™. Sixteen students stated that they did not learn any new skills but six still completed the next question which asked what they had learnt. Interestingly, one student stated that he had learnt the skills last year.

4.3.3 Student Enjoyment of Using the Internet at School

In the student questionnaire the students were asked if they enjoyed using the Internet at school. All 23 students who completed the questionnaire said that they did enjoy using the Internet at school. They were then asked what specifically they enjoyed about using the Internet at school. Responses were grouped by the researcher into three areas which were 'research', 'games' and 'copy and pasting'.

There were 13 students who chose to write a comment on enjoying research using the Internet with one student stating that "researching famous people from Australia Democracy in the past" was what she enjoyed doing during the school term. Another student stated, "doing research about human rights and creating databases on animal[s]" and another student commented, "finding information on famous Australians". Another student wrote "well I liked the challenges that we had like research and finding stuff in an amount of time".

Students also made various comments about playing online games such as "I like surfing the net for games and sports results and I like playing a game or two when I can", and "I like playing online games at lunch", showing he had computer access at lunchtimes.

Another topic students commented on was copying and pasting items. One student stated, "the thing I enjoy the most was copy and paste pictures from the Internet", while another student also stated the activity they liked "doing the most was copying and pasting pictures and information for a data base we were doing".

4.3.4 Future Use of the Internet

During the first section of the focus group interview the students were divided into pairs, and asked each other how they would like to use the Internet in the future. Each student then reported back to the group about what their partner said. Answers were varied, with one student stating he would like:

To play games, and for projects. Like it's easier to use the Internet for books while another said I would like to use the Internet for meeting people.

One student gave the very broad answer of being able to "look up the world", while another student wanted clarification of the question by asking:

Miss, can I ask you something? When you say in the future is that like when you go on a honeymoon like cheap airfares and to buy a house?

The students appeared to have an interesting discussion amongst the group while answering this question. An example of this discussion is:

1st Student: In the future she would want to use it for like more projects and ... like chats.

2nd Student: MSN

1st Student: Like when they've moved somewhere else, like they can't talk and so they talk.

When reporting back to the group one student would occasionally answer for their partner as well as themselves. This prompted one partner to expand. For example:

1st Student: We both said that we would be using the Internet in the future for looking up how to make things, like new inventions, and how things are made.

2nd Student: And new contraptions and stuff like all the new websites and that.

1st Student: Longer term like when you get married and all that you can book accommodation, buy houses, airfares and all that.

Researcher: Yes that was quite a good thing. And did you get to the shorter term?

1st Student: Just research and all that.

2nd Student: Yeah just research.

In the second part of the focus group interview, students were asked to design an activity, which their class could participate in, using the Internet in the future. This was asked to allow the students to have an alternative educational experience. The students in the focus group were able to relate their activity to the unit of work they had been studying. The focus group students divided into two groups of three to complete this task.

One group worked out the details of what a website address would be for their invented website. These three students used their first initials to come up with the website address of www.bljgames.com.au. They then set about working out specific details of the games

website. There was a discussion on having high graphics before the students decided to have “kids games, baseball, and a mixture of games”. The students were then asked to focus on what they were studying next term, which was the topic ‘Gold’. They thought they would like to research gold, and what type of gold you can get.

The other group took a different approach to what they would like to do in the future. This included:

The information that we gathered in the last term that we have gathered and we can make a website on the topic. We can write who made the website [and] where we got the information. The website is for people who are studying the topic that we have studied.

The students were then asked by the researcher if this was to “really make sure you know what you’ve learnt last term”. The student responded it was “to help them learn what we learnt” which meant that they wanted to help other students about to study the topic learn more easily.

4.3.5 Summary of Case Results

In summary, there are a number of common areas that have key patterns evident in the data gained from Class A. These include:

- using the Internet for researching, playing games, downloading and learning new information;
- learning new skills throughout the school term;
- enjoyment of using the Internet;
- using email to communicate; and,
- the amount of use of the Internet at home.

Students used the Internet for research predominantly, downloading and games at school. Accessing a variety of types of online games was reported by students in all methods of data collection. Downloading appeared to be common amongst the students with the students getting images on the Internet for their class assignments. Some students also used downloading to find music they liked and screensavers for their computers at home.

Seven students in the class felt that they learnt new skills that term with some students, in fact, stating that they learnt new ICT skills specifically but not commenting on new skills learnt with regards to the Internet. The new skills learnt included creating graphs using Excel and dragging pictures into PowerPoint™. These skills were taught by the class teacher during the school term. All students stated that they enjoyed using the Internet during the school term even though not all students learnt new skills.

Students commented that they used email to communicate with various people. They included family members, including extended family, and communicating using email with other students. Students also used the Internet at home predominantly for personal use. This was consistent throughout the school term.

Forty eight percent of students reported utilising the Internet at home. Of these students, a large 89% report they used the Internet at home for personal use, while academic use (11%) was limited and generally for homework. Over half of the class preferred to use the Internet at home with reasons for this being varied.

4.4 Case 2: Class B

4.4.1 Background

Class B was a Year 5/6 Class of 26 students from the south western Sydney region. At the time of the study, in 2004, this school had an enrolment of 196 students. From a total of 26 students in this class during the period of data collection 20 students participated in the study by completing the e-learning journals and the questionnaires. Six of these students also participated in the focus group interviews at the beginning and end of the data collection period. At the beginning of Week 3 in the school term the students were given an e-learning journal. As well, the students were free to comment in their e-learning journal at any time during the school term, with some students making more comments during particular weeks than others throughout the study. The class teacher commented that some periods of the school term were busier than others and that at these times the students had less time available to complete their journals.

As with Case A the data from this case have been described, firstly data obtained from the class teacher and then data obtained from the students. It is important to note that the Class B teacher's participation in the data collection process was limited.

The class teacher, James, stated that he had been teaching for eight years and had been integrating technology into his lessons since becoming a classroom teacher. During the preliminary interview he commented that he used technology "when and where I can. So obviously sometimes you can't because you haven't got good facilities".

Class B had one computer in the classroom, predominantly for the use of the teacher, although James did allow students to use that computer periodically. The classroom had an adjoining 'minilab' which was a small room with six networked 'Windows' computers that were shared with the class next door. The students had access to this laboratory at any time other classes were not using the room. The laboratory was also used by literacy and learning difficulties specialist teachers and teacher's aides to withdraw small groups of students from the classroom. Sometimes those students were able to use the computers as part of their withdrawal from their regular class.

In the school library there was also a computer laboratory with sixteen computers for class use. The class teachers were able to book this laboratory and take their class for additional lessons in the information and communication technology area of their class teaching and learning program. Class B had a permanent booking into the computer laboratory with their class teacher each Friday after lunch for one hour. The class also went into the library computer laboratory with a specialist computer teacher for one hour per week where the students learnt various computer skills. This was in addition to the skills learnt with the class teacher.

4.4.2 Integration of the ICT Topic for the Term

James said his class was studying the topic 'Gold' for the term and he arranged to integrate his Science and Technology outcomes into the ' unit. James indicated that he was going to use the 'Life on the Australian Goldfields' Internet 'scavenger hunt', which was available online through the Curriculum Corporation and the NSW Department of Education and Training website. James described the unit by saying it was:

Based on life on the Goldfields. Where the children [in my class] are given focus questions to answer by searching the Internet pages which are provided on the links from the scavenger hunt home page.

The Internet 'scavenger hunt' also linked directly with the New South Wales *Human Society and its Environment K-6 Syllabus* outcomes. The Internet 'scavenger hunt' website had several sections including a question section, as well as two tasks. In one, the students imagined they were a shop keeper who had come to make a fortune on the goldfields where they needed to stock their shop with ten items. The other task included the student being an editor on a goldfields newspaper where the opinions from various people such as women and the Chinese were included in the paper. From the question section of the Internet 'scavenger hunt' website there were nine questions which the students were required to answer. To assist in answering the questions the students were able to download a scaffold which was a PDF file and they were given web links to various sites to research the information. The file provided sufficient background information to be able to complete the task section of the 'scavenger hunt'.

To make it easier for the students in the class to find the 'scavenger hunt' website easily the computer teacher provided a link to the website from the school intranet. This allowed students to open the browser Internet Explorer and then easily click on the link from the school homepage which would then take them directly to the 'scavenger hunt' website on the Internet. The teacher provided support and guidance for the students which allowed for integration of ICT within his classroom.

4.4.3 Teacher Use of Technology

During the course of the interviews, James was asked about using the Internet for learning within his classroom. When asked about his use of technology throughout the term he stated:

We were meant to. We have to a minimal degree and like what we wanted to do they had a project and there's been a lot of them that have been going into the computer, mini lab and at home and I encouraged them by a list of websites that we gave, I left [them] on the [chalk] board and keep writing and adding to those [websites] and explaining some good sites that they could go to, to get information and they were doing that.

On examination of the practice undertaken during the school term in the study, the students completed an alternative project (on Gold), not the Gold Internet 'scavenger hunt' that the class teacher planned to teach. This may be attributed to interruptions that occurred when teaching with ICT. During the final interview the teacher was questioned about the possible reasons for this where he stated "it was meant to be this great scavenger hunt but we had a few problems". James was then asked to expand on the problems to which he responded:

Change! They changed my RFF time to the time when I was meant to be going to the lab and less, like I can't go to the lab like, most days in the morning or during the middle of the day due to like, the programming that we have here at the school. Whereas we've got literacy and then numeracy in the mornings and the middle sessions.

James also commented that the class teacher from the room next door left the school which “threw everything into chaos again” as the teachers at that school worked closely together.

4.4.4 Types of Internet Use

As mentioned in the previous case the students were asked to keep a record of how they used the Internet at school by completing their e-learning journal each week. Although the students were given the e-learning journals in Week 3, no comments were made until Week 5. From Weeks 5 to 10 the number of student comments made was minimal.

Table 4.6 below indicates the number of times comments were recorded in the student e-learning journals and comments were then grouped according to the type of Internet use identified. The number of students who recorded comments is also displayed in the table. The students were able to record more than one comment on any topic throughout the term. This data is indicative of the broad types of classroom Internet activities identified rather than a specific record of what occurred in the classroom.

Table 4.6 The types of Internet use, the number of students who commented and the total number of comments that occurred throughout the study by students in Class B.

Types of Internet Use	Number of Students who Commented	Total Number of Comments	Percentage (%) of Comments
Searching	1	1	3.4%
Games	2	3	10.4%
Research	3	5	17.3%
Email & MSN	3	6	20.7%
Educational sites	3	9	31%
Recreational sites	1	1	3.4%
Downloading	1	1	3.4%
Computer Skills Test	2	3	10.4%
Total	-	29	100%

Only eight members of this class recorded entries in the comments section of their e-learning journals throughout the school term. These eight students often made more than one comment, and indeed often commented on more than one type of Internet use. The number of comments made may be limiting in the information provided and any conclusions drawn must take into account that the comments were made by less than half the students in the class.

Accessing educational sites on the Internet was only commented on by three students who made a total of nine responses throughout the school term. Each of the nine student responses stated that they used ‘Ziptales’, an Australian educational Internet site where

students can read fictional stories and answer online cloze and multiple choice questions. One student commented on using this site each week throughout Weeks 5 to 10.

Students were able to check a box in their e-learning journals to indicate whether they used email during the school term. This could be recorded once a week in that particular section of their e-learning journals. There were ten students in Class B who recorded using email throughout the school term. In their e-learning journals eight of these students used email in various weeks throughout the school term. The students emailed their friends 55% of the time. Some students emailed a parent or family member which included cousins, aunts and uncles. One student emailed a friend in England while another student emailed his old school and one student in the class emailed a teacher once.

The use of email was commented on by three students who recorded a total of six comments. In their journals the students were not specific on how or where they used either MSN or email. One student stated that she used the Internet in Week 7 to conduct a search while another student used the Internet to “get pictures”. This can be interpreted as downloading images.

While only one student wrote a response regarding searching in the comments section of the student e-learning journal, the students were able to record their use of searching the Internet by completing the check box section in their e-learning journals. They were then able to record information about their use of search engines, indicating which search engine they used each week. This is depicted in Table 4.7 which shows the various search engines the students used each week throughout the data collection period. This table indicates that the students predominantly used the search engine Google while Yahoo was the second most popular. Although not a search engine there was one check made regarding using MSN and there was no recorded search engine for 21% of the checks.

Table 4.7 Number and percentage of Class B student uses of various search engines.

	Google	Yahoo	MSN	Not stated	Total
Total Uses	13	5	1	5	24
Percent (%)	54%	21%	4%	21%	100%

Three students made five comments about using the Internet for research. The students generally stated they researched “gold” although one student indicated that he used the Internet “for my project”.

The two students who commented on visiting games websites did not describe in detail what the specific games websites were. Two students also recorded that they completed the computer skills test. Interestingly, all 10 Year 6 students who participated in the study completed the test yet there were no responses to indicate this.

4.4.5 Home and School Internet Use

The students were asked in the questionnaire whether they used the Internet more at home or at school. In Class B, 12 students used the Internet more at home than at school, while 8 students used the Internet more at school. When asked where they would prefer to use the Internet 15 students stated at home while only 4 stated at school. Two students commented that they preferred to use the Internet at school because they could get help from the teacher when required while another student stated a preference for using the Internet at school “because my computer at home has less things than [the] school computers”.

Three students responded that they preferred to use the Internet at home because they felt they could access a wider range of websites there. Seven students indicated that they preferred to use the Internet at home as they felt they could access anything they wanted there, with one student stating, “the teacher’s don’t tell you, won’t interfere with your stuff and [you] won’t get into trouble”. Another student felt that there was a lack of space at school when they stated they preferred the Internet at home “because you get more space and get to eat whenever you want to. (They make me hungry)”. Two students felt they could access preferred games and another two students liked unrestricted access to email with one student stating that they use the Internet at home “because at school you’re not allowed to email and chat to friends”.

The questionnaire asked the students if they used the Internet in different ways when at home. From this class, 17 students stated they used the Internet in different ways while 3 did not, possibly due to lack of Internet access at home. Students were able to record more than one reason with four comments regarding email and four indicating that students kept in touch with friends when they ‘talk’ on the Internet. There were two comments on accessing different recreational websites such as ‘Total Girl’ and car websites, while 8 comments related to accessing online games websites. Four comments pertained to obtaining information for projects while one student stated that he could “get pictures and information about something for me”. One student used the Internet at home to “find out different web searches and having fun mucking around”.

In their e-learning journals students were able to check the days during the week that they used the Internet at home. Sixty seven percent of student responses indicated using the Internet at home for personal purposes and for academic purposes 33% of the time.

The students were asked in what types of academic ways they used the Internet. Some students used the Internet at home to do research, with one student stating, “I use the Internet at home for projects I’m doing”, and another student commenting “it usually helps me with information on projects and sometimes homework”. The students often commented that they did use the Internet for research for their gold project both by conducting searches to get information and occasionally downloading pictures.

As discussed, the students were able to record the location of their Internet use in their e-learning journal. Students in this class did not comment on using the Internet in any unidentified locations including the library. Importantly, the students did not have access to computers with the Internet in their school library at lunch time, and the area does not have a public library.

4.4.6 Student Use of Technology

In relation to using the computers at school, no student from Class B commented on any problems they had during the school term. This was despite the NSW DET blocking Internet access to all public schools. At that time the students in this class were not using the Internet, so were unaware that the Internet had been blocked.

4.4.7 Student Perceptions on New Skills Learnt

The students were asked in the questionnaire if they had learnt anything new when using the Internet at school during the period of the study. Fifteen students stated that they had learnt something new while five students said that they had not. In another question which was open ended the students were asked what types of things they learnt. Their responses included:

- I learnt about gold and other ways to get into Ziptales;
- how to put pictures onto the screen;
- I learnt that when you use the Internet to find things, the search you are looking for isn't always right;
- we learnt how to use it properly and find better research information stuff.

Four students commented on learning about gold through Internet use while many other students commented on learning about non Internet related skills. These included:

- [I] learnt to use Excel.
- I learnt about how graphs work.
- I have learnt how to use the keyboard, do graphs.
- how to do graphs.
- I learnt all different programs.
- how to make graphs and how to get more stuff on your graph, like colours.

4.4.8 Student Enjoyment of Using the Internet at School

Of the 20 students from Class B who completed the questionnaire, 18 indicated that they enjoyed using the Internet at school. In an open ended question the students were asked what types of things they enjoyed the most. The students were generally detailed with their answers and often students described enjoying more than one type of Internet activity. An example of this was "playing the games and searching for information and doing the tests". Another student stated, "I enjoyed searching on the Internet, playing games and making graphs".

A total of twelve students stated that they enjoyed playing games on the Internet at school while one student specifically stated that they enjoyed "games because there are all sorts like Willy Wonka and the Chocolate factory". Another student made the general statement, "I have enjoyed the Internet at school the most playing some of the games". Another student, while enjoying playing games, commented on the broader topic of working with her partner when she stated that she enjoyed "playing games, learning and getting partners. And so you can learn what your friends are like". The students did not indicate why they played games at school although perhaps they were given access to Internet games as part of free time activities.

Two students commented on finding information on the Internet and then creating a PowerPoint™ presentation with one stating, “I like getting information from the Internet and putting it down for a PowerPoint™ presentation”.

Four students chose to write a remark about enjoying using the Internet for research the most and four students also wrote that they enjoyed using the Internet most for searching. Two students incorporated research and searching into their individual comments. These comments were, “I enjoy searching for things, playing games and finding out things for projects” and “searching the Internet, playing games, research”.

One student who did not enjoy using the Internet at school stated “I didn’t really enjoy using the Internet at school because we only used it for information and computer test”. Another commented that he/she did not enjoy using the Internet, stating “I enjoyed free time when we could go on to Kidpix”.

4.4.9 Future Use of the Internet

During the first focus group interview the students were divided into pairs, and asked each other how they would like to use the Internet in the future. Each student then reported back to the group about what their partner said. The students from this class had brief answers which included, “for work and projects ... and I’d use it to email my mum, for work and cool stuff”.

In the final focus group interview students were asked to design an activity that their class would be able to do using the Internet in the future. The focus group was designed with an authentic task for the students to complete. The students were able to relate their activity to the unit of work they had been studying. As only five students were present for the final interview the students were divided into one group of three students and one group of two students.

The group of three students decided on two topics. One was ‘gold’, which was the topic they had been studying throughout the school term and the other ‘machines’, the topic they were going to study in the next term. The students were given paper and a pen so that they could brainstorm and record their ideas. The students thought their gold website could have “games, fun game[s], discuss[ion] things, spelling, maths games [and] English”. One student commented:

We wrote Gold games and fun games and it can ask you questions and stuff and you take out punctuation out of a paragraph of it. And then you add words and stuff to it. And discuss things and then you ask questions about it. On the Internet!

When asked what the group had decided about the topic of ‘machines’ one student said “yeah I said the topic next term, the same stuff but on a different topic”.

The other group also chose the topic of 'gold' and these students best described an activity their class could do on the Internet by writing down their description. They wrote:

Gold Engine

You click on the book you want to read and the computer will read it to you. This engine can be in Google. You just type in Gold. There could be learning gold game.

The Gold Hunt Game

You go look in mazes and you can't get stuck in stuff.

4.4.10 Summary of Case B Results

The key patterns that emerged from this case include:

- the use of educational websites at school and emailing at home by the students;
- using the Internet at home for personal use twice as much as for school use, with researching a school project on gold being the other most common home use; and,
- students predominantly did not report learning new technology skills throughout the school term.

The students used only a small variety of educational sites throughout the school term with the most common one being *Ziptales*, an Australian educational Internet site.

The most common search engine used was Google with 13 comments on using Google throughout the school term.

The use of email was popular with students in the class emailing friends 18 times throughout the school term. Students also indicated that they emailed a variety of other people, with five emails to a parent and five emails to other family members.

Fifteen students stated that they had learnt something new during the school term while five students said they had not, although, importantly, many students commented on learning non Internet related computing skills. This suggests a lack of specific ICT teaching by the class teacher.

Students appeared to enjoy using the Internet at school with eighteen students stating this. Students indicating that they particularly enjoyed playing online games most with a total of twelve responses.

4.5 Case 3: Class C

4.5.1 Background

Class C was a multicultural Year 6 class from a southern Wollongong suburb with 14 nationalities represented at the school. Students from the Macedonian, Spanish and Arabic communities were the largest representations in the class.

This class predominantly used the Internet during the class teacher's Release from Face to Face (RFF) time. The New South Wales Department of Education and Training provides release from the classroom of two hours per week for full time class teachers for the preparation of class materials (referred to as RFF). In this school, Melissa, the teacher referred to in this case, was the school's specialist computer teacher who taught each class for one hour per week during RFF. Melissa taught information and communication technologies (ICT), or more specifically computer technology to the 27 students in this class in the school computer laboratory. Melissa was in her sixth year of teaching, had been at the school for two years at the completion of this study, and had taught at other schools previously.

From Class C, 25 out of a possible 27 students participated in the study. E-learning journals were collected from all 25 of the participating students and 24 of the students completed the questionnaires. Three students participated in each of the focus group interviews.

The school computer laboratory consisted of 30 e-Mac computers allowing students to each use a computer while participating in class activities. One computer was connected to an LCD projector, allowing the computer screen to be projected onto a wall.

Each classroom was equipped with one computer for student use. This was located at the side of the classroom. The Class C classroom was located next to the school's computer room, which meant that the students could occasionally go into the computer room to do individual work on the computers.

4.5.2 ICT Topic for the Term

When asked what she was going to teach for the term, Melissa stated:

I'm doing Internet stuff with the Grade 5/6s. I'm actually doing it with Grade 1 [and] up this term. [I'll be] teaching Internet skills because I'm starting back with the basics.

Melissa commented that she had taught the students using the Internet previously and she had set the students an "independent mini project that they are about to begin in Week 3" as a follow on activity. The topic for the term was the Olympics, and the students were required "to choose an Olympic sport that they don't really know much about". Melissa explained that the students would need to research their chosen topics on the Internet and construct PowerPoint™ presentations based on what they had found. Melissa gave the students specific instructions, in the form of a handout, on what they were to research.

The aim of the lessons was for the students to improve their skills in using the Internet to locate information for their projects. Melissa described her approach:

I don't set up bookmarks or anything for them, especially the seniors. It's a free for all, [and] they know all the different search engines. They've learnt all the different search engines and [know] which ones might be better ones and all that sort of stuff. They've learnt about how to refine their searches. So it is pretty much 'go for it' but with me assisting where they need it. Whereas you go into the junior classes and I'm just modelling, 'okay this is how we are going to, this is what we do'.

Melissa arranged this activity to commence after the students completed the compulsory New South Wales Year 6 computer skills test as the test was a major focus during the school term. She commented that the school planned to do the test in Week 5 of the school term after the students spent time downloading the software requirements for the test, thus saving Melissa time. Therefore, in the second half of the school term program Melissa planned for the students to research the chosen topic.

Interestingly, the project that the students completed was separate from the class teacher's teaching and learning program. Melissa stated that during the first school term for the year the class used the Internet in a way that was fully integrated into the class teaching and learning program. Therefore, this term she would give the students a task that was not integrated with the class program, but that used the Internet. Melissa said she would "get them ready for Athens"; that is, the students would learn about the Olympic Games which were to be held in Athens later in the year. By teaching this unit a term early Melissa felt the students would be more prepared and have greater knowledge when the Olympics began.

4.5.3 Types of Internet Use

The students kept a record of how they used the Internet at school by completing their e-learning journals each week. The students were given the journals during the first week of the school term and so were able to complete them between Weeks 2 to 10.

Table 4.8 below lists the number of times comments were recorded in the student e-learning journals according to the type of Internet use. The number of students who recorded these comments is also displayed in Table 4.8. The students were able to record more than once on any topic throughout the term. This data should be viewed as indicative of the types of classroom Internet activities rather than an exact record of what occurred in the classroom.

Table 4.8 The types of Internet use, the number of students who commented and the total number of comments that occurred throughout the study by students in Class C.

Type of Internet Use	Number of Students who Commented	Total Number of Comments	Percentage (%) of Comments
Searching	4	4	7.3%
Games	5	6	10.9%
Research	2	4	7.3%
Email & MSN	9	10	18.2%
Educational sites	2	2	3.6%
Recreational sites	4	6	10.9%
Downloading	12	14	25.4%
Computer Skills Test	8	9	16.4%
Total	-	55	100%

The three most common types of Internet activities were downloading, email/MSN and the computer skills test. Games and recreational sites accounted for almost 22% of the comments. Participating in research and searching the Internet accounted for over 14% of student comments, while accessing educational websites only accounted for 3.6% of student entries in their e-learning journals.

Further analysis of the e-learning journals revealed that downloading was an activity that occurred for school and personal use, with over 25% of comments pertinent to this. Student comments included “I had to download software for the school computers”, and “we downloaded some information for tests we have to do in a week or two”. Another student insightfully stated, “Safari is faster at downloading than Internet Explorer”. Another student did not indicate where she used the Internet with her comment, “I went to songs and downloaded some songs for my brother for his phone”, although this does suggest home use.

As depicted in Table 4.8, only 16% of student comments were related to the computer skills test. Six of these entries recorded that the students downloaded the test software to allow the teacher to conduct the test with all Year 6 students in the school. Although all the students in the study participated in the test, only eight recorded this in their e-learning journals. Perhaps the students did not regard participating in this test significant and thus comments were not recorded in their e-learning journals.

Educational websites were classified by the researcher as sites the students accessed for educational purposes. When the students searched the Internet for downloading at school this was classified accordingly. Thus only two students made two comments each concerning accessing educational sites. One of these was when a student commented on accessing a website regarding the news. This student wrote that he “look[s] at Mods checkout the news” while another student commented they “do maths on the Internet”.

The students were also able to record their use of searching the Internet by completing the check box section in their e-learning journals. They were then able to record information about which search engine they used each week, resulting in a large total for the term. These data are presented in Table 4.9

Table 4.9, which shows the number of times the students indicated that they used various search engines throughout the data collection period. This table indicates that the students predominantly used Google, while only half of that number indicated use of Yahoo. Some students recorded that they used Internet Explorer and others Safari. Although not technically search engines, Safari and Internet Explorer have a search section in the browser which the students may have accessed.

(Note: In this section of their e-learning journals the students were not required to identify the specific content they searched for.)

Table 4.9 Number and percentage of Class C student uses of various search engines.

	Google	Yahoo	MSN	Ask Jeeves	Internet Explorer	Safari	Not stated	Total
Total Uses	32	16	1	1	12	1	4	67
Percent (%)	47.8%	23.9%	1.5	1.5	17.9%	1.5%	5.9%	100%

Communication by email and using instant messaging (MSN) was popular, with over 18% of the comments in the student e-learning journals relating to this. Student comments included, "I used [the Internet] to check my email", and "to chat with friends". It is interesting to note that students in this class also used the word 'talk' when referring to these forms of communication. One student recorded, "I went on the Internet to talk to my friends on the Internet", while another commented, "I also used [the Internet] to talk to friends".

Students were also able to indicate their use of email throughout the school term. This could be recorded a maximum of once a week in the check box section of their e-learning journals. There were nine Class C students who recorded using email throughout the school term. In their e-learning journals most of these students recorded emailing in most weeks of the term. For example, three of these students recorded using email in six different weeks in the school term, while three other students recorded emailing in five weeks. The other three students who recorded using email used it between one and three weeks. The students could also record who they emailed, with 84% of these students recording that they emailed friends. The other 16% of recipients were not specified.

Almost 22% of students in this class recorded using the Internet for leisure activities such as playing online games and accessing recreational websites. One student stated that she used the Internet to "play online games", while another recorded using the Internet "to look for game cheats", and another used the Internet to "download games". One student accessed a recreational site to look at "cool pics" and "to look at screensavers", while another student "used the Internet to feed my neopet". Another student commented that he was "bidding on stuff", and another said he "looked at pictures of my teacher's band".

Student comments were classified by the researcher and reveal limited academic use, with only 7.3% of student comments during the school term pertinent to searching the Internet for school activities. One student stated that they searched the Internet by “looking at things on Google”, while another student described beginning the project the class was asked to do by the computer teacher. She stated:

We looked up Google and searched Athens Olympics 2004, and each person in the class had to choose one Olympic sport they don't know much about and I chose Gymnastics. There is great information thanks to Google.

4.5.4 Home and School Internet Use

In the questionnaire, the students were asked whether they used the Internet more at school or at home. In Class C, 10 students used the Internet more at home than at school, while 14 students used the Internet more at school. When asked where they prefer to use the Internet 19 students said at home while 4 students stated at school. Students' reasons for their preference varied. Two students preferred to use the Internet at school because they did not have a computer at home. Two students stated that they preferred to use the Internet at school, with one recording “because there are friends to help you”.

Three students preferred to use the Internet at home as they had more time there, while five students felt that they could do more things on the Internet at home, with one student commenting she could “do whatever I want”. Two students thought that using the Internet at home provided more privacy, while one student felt that he had access to better information. One student wrote that he used it at home because he “did not get yelled at”. Another commented specifically that she preferred using the Internet at home, “so I can use hotmail, MSN and talk to people in my own privacy”.

The questionnaire asked the students if they used the Internet at home in different ways to when they used it at school. Eleven students said yes and eleven said no. The students who stated yes indicated that at home they play online games, chat, check emails, use MSN, and “search to buy”.

In their e-learning journal students were able to indicate on which days each week they used the Internet at home. Students reported using the Internet at home for personal use each week, with the vast majority of 96% of their responses indicating this. They only used the Internet at home for academic purposes 4% of the time. This could be because they did not have school work that needed to be completed at home or perhaps because their homework did not require Internet access.

In the questionnaire, the students were asked in what type of academic ways they used the Internet. The students stated that they used the Internet for projects, to search the Internet and “finish my work”. One student stated she used “online dictionaries and thesauruses and encyclopaedias” at home.

As discussed, the students were able to record the location of their Internet use in their e-learning journal. Predominantly students used the Internet either at home or at school, but occasionally they indicated another location. These included the public library, an Internet café, friend's house, an auntie's house, father's house and cousin's house. This may suggest that students will use the Internet when various opportunities become available.

One student commented on particularly enjoying using the library computers although he did not expand on how he used them.

4.5.5 Limitations to Student Use of Technology

The students in Class C experienced several limitations in their use of the Internet during the school term. The limitations experienced by the students were discussed during the second focus group interview conducted at the end of the data collection period and school term. These limitations were also recorded in the computer teacher's 'Internet Use Questionnaire' which Melissa, the school computer teacher, completed in most weeks. These limitations were grouped by the researcher into the following categories:

- time allocation in the computer laboratory;
- technical problems; and,
- the speed of using the Internet.

Time constraints were the major limitation for Class C. One student commented that getting time in the computer laboratory with the specialist teacher was a problem because the class had "to keep changing [the] days" they went into the school computer laboratory because of other school events. These included a school music event, a walkathon and teachers going on strike twice.

Technical issues were also a problem throughout the school term. The Class C students commented that their use of the Internet was interrupted by that "government thing", indicating that they had no Internet when the New South Wales Department of Education and Training blocked Internet access for all schools because of a problem with blocking particular searches on Google which students from other schools were attempting.

The only other limitation students in Class C commented on was that the Internet was "a bit slow" with students stating this during the focus group interview. One student commented that he had fast Internet access at home and compared to this the school access was slow.

4.5.6 Student Perceptions on New Skills Learnt

In the questionnaire, the students in Class C were asked if they felt they had learnt new skills. Fourteen students felt that they had learnt new skills, while 10 students in Class C felt that they had not. The student comments about new skills learnt while using the Internet at school included general comments by two students, such as learning "lots of stuff and things". In the e-learning journal one student commented on learning how to download things from the Internet. No student made this comment in the student questionnaire which was completed at the end of the school term.

The remainder of the student comments from the questionnaire can be grouped into three categories: learning information about the topic studied; using Microsoft Excel; and learning new technical skills. One of the students who commented on learning new information stated that she learnt "about the Olympics [and] about tigers", while another commented that he learnt about "Bali and [the] Olympics", and a third stated that he learnt "how to use the Olympics Internet". Two students in this class commented on learning Excel but it is not clear whether or how they thought this related to the Internet. Three students commented on new technical skills learnt, with one explaining that she learnt "how to properly use search engines", and another student stated that he learnt about "adding in favourites". A third student wrote:

If you get a message on the screen and roll down [then] if the message doesn't go down it's not important.

This may have been referring to learning about advertising on the Internet.

One of the students from Class C who stated that he did not learn anything new during the school term expanded on this by stating, "nothing new [was] learnt because I learnt [it] at home".

4.5.7 Student Enjoyment of Using the Internet at School

Of the 24 students from Class C who completed the questionnaire, 22 indicated that they enjoyed using the Internet at school. In an open ended question the students were asked what types of activities they enjoyed the most. The students generally gave specific examples of what they enjoyed doing with the Internet at school; although one student recorded that he enjoyed having "free time". Several students recorded that they enjoyed using the Internet for research, with four students indicating that they enjoyed researching the Olympic Games. Other students were not as specific and recorded that they enjoyed "looking up stuff". One wrote that she enjoyed "searching for certain subjects" and another still stated that he enjoyed "exploring the different websites". There were other students in Class C who recorded that they enjoyed "using the Internet", while one student specifically stated, "I like surfing the Internet". Another student enjoyed using Google and another liked "looking for websites". Finally, one student stated that he enjoyed "playing games".

4.5.8 Future Use of the Internet

During the first focus group interview the students were kept in one group, and as a group they asked each other how they would like to use the Internet in the future. Each student then discussed their answers.

When asked about using the Internet in the future one student in the Class C focus group stated, "I reckon it is good the way it is. It is pretty cool". The researcher then asked a clarifying question and the student responded, "I reckon it's heaps good how it is now". The students also commented that they would like to be able to make their own "web pages" in the future, with one student stating that he already had his own page, but he would like to create more.

As part of the second focus group interview the students worked in one group of three, as the other students were absent from school, to design an activity that their class could do using the Internet in the future. The students were asked to relate their activity to the unit of work they had been studying at school during the term.

The students in the focus group suggested, "we could make a website or something, like we could do a project". The students then discussed what they might like to create their project on with one student suggesting creating a website on cars. When asked to expand on this, another student went on to say:

We could do it on, like a project on like something interesting and tell them how to do it. So we could just take photos with the digital camera and everything.

4.5.9 Summary of Case C Results

In summary, there are a number of patterns that have emerged from the data collected from Class C. These include:

- downloading as a common activity;
- the use of email;
- the use of Google as the main search engine;
- the use of the Internet at home or at school; and,
- enjoyment of using the Internet.

Downloading was the most common Internet activity for this class. Over a quarter of student comments in their e-learning journals pertained to downloading, and these comments spread in the class with 12 students making a total of 14 comments. This was in part due to students downloading software for the school computer skills test, while other students commented on downloading information for school, perhaps referring to images for their PowerPoint™ presentations.

Using email was also significant, with almost 20% of students commenting on this activity. This was supported by the use of the check box section in the student e-learning journals, where nine students recorded using email through the school term. Friends were the most frequent recipients of emails.

Students predominantly used Google for searching the Internet with almost 50% of student comments in the e-learning journals indicating use of this search engine. Students in this class did use other search engines, with Yahoo being mentioned in 24% of comments. They also indicated using the Internet at school much more than at home. At home they used the Internet most frequently for personal use, including for email/MSN, while at school the students generally used the Internet for research.

The students experienced two major problems in using the Internet during the school term. Due to multiple activities in the school week, Class C had to keep changing their day for computer use or miss computer access for the week. The class also could not use the Internet when the New South Wales Department of Education and Training blocked Internet access for all schools for approximately two weeks.

Just over half of the students in Class C felt that they learnt new skills using the Internet during the term. Of these 14 students, only three indicated that they learnt new information regarding the topic they studied, and six students indicated that they learnt new technical skills.

The students predominantly enjoyed using the Internet at school throughout the school term, with 22 of the 24 students in Class C experiencing this.

4.6 Case 4: Class D

4.6.1 Background

The Year 4 class that participated in the study is located at a school in Wollongong and confirmed 23 students during the data collection period, with 21 students choosing to participate in the study. There were 21 journals collected at the end of the school term and 20 students completed the questionnaire. Six students from this class also participated in the focus group interviews at both the beginning and end of the data collection period. The students began completing the e-learning journals at the beginning of Week 2 of the term, so there were no results for Week 1. The students were free to comment in their e-learning journal at any time during the school term with some students making more comments than others. Some students also commented in more detail than other students. Again, the results for this case are described firstly using data collected from the class teacher and then using data from the students.

In 2004, Class D's school had an enrolment of 310 students. Approximately 18 percent of the students were from a non-English speaking background, with most of these students being from the Cook Island community. Eight percent of the students in this school were from an Aboriginal background.

The class teacher, Matthew, stated that he had been in the teaching profession for 33 years. When asked how long he had been integrating technology into his class teaching and learning program, Matthew explained:

Since it first appeared! [When] technology appeared back in about 1983 or 84, somewhere around that time anyway, when we started getting computers into the schools.

Matthew went on to describe when he first began integrating technology into his lessons:

The old Apple Ile's came out and I started integrating [technology] then. Well, it was very difficult because you didn't have any resources and that sort of thing, but once we started [integrating technology] and acquired the resources it was much different and it put a different aspect towards learning.

Matthew stated that in his classroom he had two computers. He said that they were mainly used so the:

Students are able to extend their own learning [by] focusing on their own interests which are not specific with what I'm teaching within the classroom. And they'll go on, go to the Internet and seek their own information out, on their own interest levels.

The school also had a computer room equipped with 24 computers and an LCD projector. The computer room was used by Class D with the Release from Face to Face (RFF) teacher who taught them specific computer skills each Tuesday for 40 minutes. The class teacher would return after the 40 minutes for a further 30 to 60 minutes of lessons that integrated information and communication technology skills into the class teaching and learning program.

One morning each week the class would split into two groups, with Matthew taking one group into the school computer room, with the other group going to the library. The groups would alternate each week and would do these activities for approximately one hour.

Although there were computers in the library at the time of the research the librarian had not “integrated a lot of the technology into what they are doing”. Matthew explained that the library sessions were focused on students “learning basic library skills”.

4.6.2 ICT Topic for the Term

Matthew stated his class were studying ‘British Colonisation’ for the school term. This unit is part of the *Human Society and its Environment* key learning area. He said they were using the website developed by the New South Wales government’s Country Areas Program which included activities on this topic. He explained that, “students have been working on the First Fleet database information where they have to acquire [specific] information concerning the First Fleet” convicts. Matthew commented that the class were:

Using the Internet as a resource for finding information about convicts and the ships of the First Fleet. It also helped us find [out] what a convict was like, what they were doing. There were lots of convict stories on [the site] and it talks about their life. My kids were able to write some excellent stories [using the information].

Matthew felt that using the Country Areas Program website was an effective way to integrate the Internet with his class teaching and learning program. This website, created for and used by teachers across New South Wales, was designed for teachers in rural public schools to assist in enhancing learning outcomes of their students (Early Childhood Primary and Rural Education Directorate, 2001). One of the focus areas of this website is a collection of research modules which have been designed for students to use the Internet to gather information as well as be able to select, analyse, and organise this information (New South Wales Department of Education and Training, 2001).

The students used spreadsheets to record data about the ships of the First Fleet, and to note where they had sourced this information using the Internet. Matthew went on to comment about student enjoyment of the unit, “the kids have had a great time using the Internet as we’ve gone [along]. It’s been a lot of fun for them as well. It’s made learning fun for them”. Matthew commented that he made this learning fairly directed for the students in that:

I’ve directed them to two or three sites. Some of the more gifted children have been able to head off and locate other information and some have even been into finding music from the First Fleet, like Botany Bay songs. They’ve added those things to their PowerPoint™ presentations. So it’s been quite good.

Matthew stated there were “one or two technical hitches that stopped us” from using the Internet during the school term. He went on to say:

The Department [of Education] has some problems with their site so that obviously put a damper on things. But once again you’ve got to be prepared for that. You can’t just go into the room and say oh everything’s going to work perfectly.

Matthew revealed that he had a:

Sort of contingency plan for anything, for anything like that, that may occur and I found that was quite easy to. We just packed up and did another activity on the computer, [without the Internet].

Matthew felt that a contingency plan was an “important aspect of using the Internet”. He had experienced problems previously and he concluded by stating that he used a contingency plan “just in case something goes wrong like that”.

4.6.3 Types of Internet Use

There was a range of student uses of the Internet noted during the period of data collection. These included searching the Internet for information, games, research, using email or MSN, going to recreational and educational websites, as well as downloading. These uses are shown in detail in Table 4.10 which shows the number of times comments were recorded for each activity in the student e-learning journals. The number of students who commented in their journal for each use is also recorded. This data relied on students writing a comment in their e-learning journals on the particular Internet activities they completed.

Table 4.10 The types of Internet use, the number of students who commented and the total number of comments that occurred throughout the study by students in Class D.

Types of Internet Use	Number of Students who Commented	Total Number of Comments	Percentage (%) of Comments
Searching	1	2	3.1%
Games	4	4	6.2%
Research	11	27	41.5%
Email & MSN	1	1	1.5%
Educational sites	4	5	7.7%
Recreational sites	7	8	12.3%
Downloading	1	1	1.5%
Unknown	5	17	26.2%
Total	-	65	100%

The most common use of the Internet was for research (which contrasts with Case C), which was commented on by more than half the students participating in the study, with over 40% of all student comments on this topic. Other significant activities were accessing recreational sites (12% of student comments), while accessing educational sites (almost 8% of the comments). There were 17 entries, made by five students that were classified as unknown. This was because these students made comments that did not particularly make sense. For example, one student in most weeks recorded in her e-learning journal

“[I] have nothing to say”, while another student wrote an eclectic array of items that were perhaps his Christmas wish list.

Eleven students made 27 comments, (42%) in their e-learning journals relating to research. In explanation, one student simply stated he used the Internet “to look up more information”, while another student was very specific in listing the following items:

First Fleet database of convicts Country Areas Stage. Convicts of the First Fleet. First Fleet spread sheet. First Fleet slideshow. Download pictures and music. Convict stories. Countries!

Another student stated, “I have been doing a project on Captain Cook. We use the Internet as well as the library”, meaning this student also uses printed resources from the library at school.

There were eight responses regarding use of the Internet to access recreational sites, seven of which were in Week 4 of the school term. This week the students may have had some free time and been allowed to access these sites by their teacher, if they had completed class work. One student commented that he went to “tanks (army), planes (Tomahawk), army, cartoons, guns, reptiles, scorpions, [and] lizards” websites, while another student stated that he used the Internet to look up “the V8 Super cars Australia and I like to look at the Big Brother website”.

There were five comments related to accessing educational websites while there were four comments about accessing games websites. Only two comments were made about searching the Internet. One student commented on emailing and downloading “pictures and music”.

The comments about the games sites were general, such as “I really like playing games on the Internet”. One student indicated games she would like to play in the future by recording, “I would like more games on the computer, like convict games”. One student made a specific comment by stating simply he likes the “Pokemon” website.

The various computer uses were also classified by the researcher into whether the student used the Internet in an academic or recreational way. Students, in relation to academic use, made comments about studying Captain Cook, with one student stating “learning about Captain James Cook and about the convicts, how they felt and the ships. [I was] looking up convicts”. Another student also specifically commented that she researched “how long Australia’s been around for as well as how old Cook was when he died”. One student was very general with his comment recording that he had been “looking up different things and going on Internet Explorer”. Some students recorded looking up information on Norway.

While only one student made comments about using the Internet for searching in his e-learning journal the students were also able to record their use of searching by completing the checkbox section of their e-learning journals. The students were also able to record which search engine they used each week. This data is shown in Table 4.11 which indicates various search engines the students used throughout the data collection period.

Table 4.11 Class D student uses of various search engines.

	Google	Safari	Internet Explorer	Not Stated	Total
Total Uses	52	2	2	19	75
Percent (%)	69.3%	2.7%	2.7%	25.3%	100%

The results indicate that almost 70% of students' comments record searching with the Google search engine during the school term. There were 19 student entries that did not specify which particular search engine was used. Safari and Internet Explorer were indicated in 5% of comments. This suggests that these very few students did not differentiate between these commonly used browsers and search engines.

Not shown in Table 4.11, were students who recorded searching the topic they were studying and what search engine was used. Five students recorded searching for the "First Fleet" and three students searched for "Captain Cook" while six students recorded searching for "convicts" throughout the school term. These students did not state at all what search engine was used.

The use of email was not prevalent in this class, with only one student recording one positive comment for it throughout the school term. However, students were also able to indicate in journal check boxes if they used email throughout the term. Only six students in Class D recorded using email and four of these students only recorded emailing during one week of the term. One student recorded emailing twice, and another student sent emails in eight of the weeks. Five of the students recorded emailing friends while one student emailed her aunt.

4.6.4 Home and School Internet Use

From the questionnaire completed by students in Class D, only one student stated using the Internet more at home than at school, while 18 other students used the Internet more at school. When asked where they preferred to use the Internet only three students stated at home while 12 students stated at school. One student stated that he could "search anything I want and more" when using the Internet at home, while the students' explanations for preferring to use the Internet at school were varied. Three students used the Internet at school because they did not have a computer at home, while two students felt they could look up more things and three students felt they had more time on the school computers. One student stated that he would rather use the Internet at school, "because it's easier, quicker and [we] have more info on subjects".

The students in Class D completed their e-learning journal each week and they often recorded on which days they used the Internet at home and whether the use was personal or for school. The students in Class D mainly used the Internet at home for personal purposes, although 2 students recorded occasionally using it at home for academic purposes. Students reported using the Internet at home for personal use 82.5% of the time while they used it at home for academic uses only 17.5% of the time.

In the questionnaire, the students were asked if they ever used the Internet at home to assist with school work and only two students stated yes. One student used the Internet to assist with homework while the other student looked “up convicts because that’s what we are learning about”.

Thus, the students from this class preferred or were only able to use the Internet at school. However, when they did use the Internet at home it was generally for personal use.

4.6.5 Limitations to Student Use of Technology

Students commented on several problems when using the computers at school. The problems for the students in Class D were grouped by the researcher into the following categories: lack of speed of the Internet, technical problems; and time problems. The problems experienced by the students during the school term were discussed during the second focus group interview, with six students, which was conducted at the end of the school term.

One student felt that the speed of the Internet was a problem as she stated “the Internet was really slow”. A technical problem identified by one student was that “it won’t let me download stuff”, although this student did not expand on how the computer would not let him download things. This may have been because they were incorrectly using the computer or perhaps the network was having problems at that time. One student felt he should be allowed “more time on the computer”. The students reported few problems during the school term, possibly because there were not many at the time of data collection.

The students from this class failed to mention the New South Wales Department of Education and Training outage during the school term. This may have been due to the excellent preparation of the class teacher, who ensured that the students used non-Internet related programs on the computers during that time.

4.6.6 Student Perceptions of New Skills Learnt

In the student questionnaire, students were asked if they felt they had learnt anything new when using the Internet at school during the term. Eighteen students stated that they thought they had learnt new skills while two students in the class felt they had not.

Students commented extensively on learning about their *Human Society and its Environment* topic, for example one student explained that he learned about “convicts of the First Fleet and how Captain Cook got killed by the Hawaii people” and that “some ships did not carry any convicts”. Another student was more specific in stating he learnt by “doing our First Fleet slide show”. One student was very general and stated that she learnt “about the world”. One student summed up the student learning in this class by stating “we learnt about lots of things like convicts and slide shows and lots of other stuff,” while yet another student stated he learnt about “the First Fleet, convicts and Captain Cook”.

Other students commented on learning skills related to using computers and the Internet. Two students stated that they learnt “how to use bookmarks”, with one student stating she learnt “how to change the style of the writing and how to change the size of things,” while the other student learnt about “changing different fonts and different sizes, plus, how to get

colour on [the PowerPoint™ presentation]”. Another student recorded that she “learnt that you can’t go onto some web pages”, while yet another student commented on learning “how to look up websites, how to make a slideshow”.

4.6.7 Student Enjoyment of Using the Internet at School

Twenty students from Class D completed the questionnaire at the end of the school term. Every student who completed the questionnaire indicated that they enjoyed using the Internet at school. The students were asked to specify what they enjoyed about using the Internet at school, and they often recorded more than one such activity. An example of one student’s response was, “making convicts stories, playing games, looking up information about the First Fleet and sea life”. The students predominantly recorded enjoying four different types of activities: researching information; playing online games: looking at websites; and using iChat to communicate with others.

From the seven students who recorded enjoying researching using the Internet at school, responses generally involved research on Captain Cook and convicts. One student stated “my favourite thing was typing a convict. And the First Fleet and a convict tale story”, while another student, although repetitive commented she enjoyed “typing my convict stories, slide show on the first fleet and typing my funny convict stories”. Another student enjoyed studying “convicts because it is interesting”.

Ten students recorded enjoying playing games on the Internet during the school term. These responses varied from general statements of “[I enjoyed] playing games”, to more detailed comments such as that of the student who enjoyed “going to the Bart’z game the fashion for bashen”. Another student enjoyed “going to www.disney.com” while yet another recorded enjoying “black goku [and] www.cartoonnetwork.com”.

Other students enjoyed looking at various websites, such as the student who enjoyed “looking up army tanks and then putting them as my screen saver”. Another student enjoyed going to “animals and sea creatures” websites.

There were three students from Class D who stated that they enjoyed using iChat. Two of these students did not give a reason as to why they used iChat but one student did comment they enjoyed “going to i-chat so I can talk to my friends”.

4.6.8 Future Use of the Internet

During the first focus group interview the students were divided into pairs, and asked each other how they would like to use the Internet in the future. Each student then reported back to the group about what their partner said.

In the focus group interview one Class D student stated that he would “like to use the Internet to buy clothes [and] get clothes”. Two other students stated that they would like to use the Internet in the future “to learn about the world”. Another student agreed with this by commenting that they would like to “learn about all the different parts of the world”.

In the second focus group interview, the students in Class D were asked to design an activity that their class could do using the Internet in the future. The focus group designed a potential task for the rest of the students to complete; that is, an authentic educational task. The students in the focus group were then able to relate their activity to the unit of

work they had been studying throughout the school term or were going to study in the next term. The students were divided into three groups of two to complete this activity.

The students in Class D discussed the fact that they would be studying insects next term. With this in mind one pair discussed what they would like to do with regards to the Internet and insects. One student stated he would like doing “insect games and looking up things that we’ve been learning”. His partner expanded by adding “and looking at things around the playground and putting them on the Internet”. Another pair thought they would like to make their own website and when asked exactly what topic the students stated “games and on cicadas”. The third pair thought they could look up “grasshoppers and different insects”.

4.6.9 Summary of Case Results

There are several key patterns evident in the data collected from Class D. These include:

- access to the computers at school;
- using the Internet for research;
- a lack of emailing others;
- using one particular search engine;
- using the Internet at home;
- high levels of student enjoyment; and,
- new skills acquisition.

The students were given ample access to the computers at the school with approximately three hours per week spent on a computer. They used the computer laboratory with both the specialist computer teacher as well as with the class teacher who integrated technology into the teaching and learning program. The students also had access to the computers in the classroom and half the class went to the school library once a week.

The students most frequently reported using the Internet to obtain information with eleven students making 27 comments indicating this. Students specifically used the Internet to research information on Captain Cook’s voyages.

Few students in this class used the Internet as a communication tool, with only 15 references in their e-learning journals relating to email throughout the school term. Although this appears to be a low level of email use it is important to remember that the students are only in Year 4. It is interesting to note that some students used instant messaging. The students in this class most frequently used Google as their search engine.

The students mainly used the Internet at school for research, while only 5% of the students used the Internet at home a little and for a variety of personal uses. Only 20% of the students indicated that they preferred to use the Internet at home. When using the Internet at home the students generally used it for personal use, the specifics of which were not recorded in the students’ e-learning journals. The data indicate a pattern of access whereby most students in this class did not have access to the Internet at home, which is probably be why most of the class used the Internet at school.

All but two students in the class felt that they learnt new skills throughout the school term. The students stated that they learnt information regarding the convicts of the First Fleet which suggests the computers at the school were successfully used as a tool to assist in the students’ learning.

All of the students in Class D recorded enjoying using the Internet at school. Students reported that they often enjoyed more than one aspect of using the Internet and the computers at school during the data collection period. The students enjoyed researching information, visiting various Internet websites, using i-Chat for communication and playing online games.

The students who were creative in their thinking would like to use the Internet in various ways in the future for both personal purposes and to learn information. This included purchasing different products online and learning more about the world. The students would also like to create their own web pages in the future as well as looking up factual information on the topic they will be studying in the next school term.

4.7 Case 5: Class E

4.7.1 Background

The Year 3/4 Class (Class E) from south western Sydney region that participated in the study was from the same school as Class B. There were 196 students enrolled in this school at the time of the data collection.

All 26 students in Class E during the data collection period volunteered to participate in the study and all 26 students in the class completed the e-learning journal during the school term. The first entry by the students in the e-learning journal was in Week 5 of the term. The students were encouraged by their teacher to feel free to comment in their e-learning journal at any time. Eighteen students completed the questionnaire at the end of the school term. This low response rate of 70% of students in the class can perhaps be attributed to high absenteeism at the end of the term when the questionnaires were completed.

The class teacher, Janine, reported that at the time of the initial interview she had been teaching for 26 years, and that she had been integrating information and communication technology into her class teaching and learning program for the past 10 years. Janine described how she began teaching with computers:

Ten years ago I used to use the old Apple II's when I had the gifted and talented class. What I used to do was give them the Logo Lego and they would design and create and program using Logo Lego. So that would have been my first experience using it.

Class E's classroom was equipped with one teachers' computer which was occasionally used by students. Adjoining the classroom was a 'minilab', which was a small room with five networked computers that were shared with the class next door. The students had access to this 'minilab' under teacher supervision when the other class was not using the room. The room was sometimes used by specialist teachers and teacher aides to withdraw small groups of students from the classroom.

As indicated above for Class B, the school library was also equipped with a computer laboratory. The class teachers were able to book this laboratory for their class to complement the information and communication technology components of their class teaching and learning program. The class also used the computer laboratory with a specialist computer teacher for one hour per week, during which the students were taught various computer skills.

4.7.2 Integration of the ICT Topic for the Term

Janine explained that the class was "doing the human body this term and integrating it with technology, developing [with me] a WebQuest for classroom use". Janine said she linked other web resources from the WebQuest to cater for the needs of the students in her class. Janine went on to comment, "I think that was probably the hardest thing this year, trying to find sites that could be understood" by the students in the class. When asked to provide an example, Janine explained that she had shown the class a diagram of a skeleton, "and they've got to [do a] search. The skeleton [was] unlabelled so they then have to go and use the link to [find the information to] label it".

The students would also use their time with the specialist computer teacher to complete a different WebQuest. The topic for this WebQuest was the “Voyages of Captain Cook” where the students were to use a WebQuest from the Country Areas Program (CAP) website to access various websites on Captain Cook’s three voyages. The students were then to complete and present a PowerPoint™ presentation to the class at the end of the school term.

During the final teacher interview Janine was asked about using the Internet as part of the class activities throughout the term. When asked about her use of technology she stated:

I actually spent four days during the last school holidays and used the Internet to create a lot of the booklets that my children are now using in class this term. I actually developed a WebQuest but due to the constraints within the school I’ve been unable to use the computer in my classroom [the way] I’d like to.

Janine commented that one of the constraints in the school was the expectation of students scoring highly in a state wide Year 5 Basic Skills Test. She felt that the school did not prioritise the teaching of computer technology and expected teachers to teach “fourteen text types and have their English and Maths up to scratch for the basic skills test”. Janine had also been absent on sick leave for four weeks which she said had had a negative impact on the class’ computer use because she needed to catch up and teach basic skills on her return to work.

4.7.3 Types of Internet Use

By analysing the student comments from the e-learning journals it was possible to identify the various ways in which the students used the Internet during the school term. The data derived from their e-learning journals is shown in Table 4.12. The students in Class E completed their e-learning journals sporadically, which can be attributed to Janine, their class teacher being absent on sick leave for part of the school term. The students did not record a comment in their journals at all prior to Week 5. The number of students who made these comments is also displayed in this table.

Table 4.12 The types of Internet use, the number of students who commented and the total number of comments that occurred throughout the study by students in Class E.

Types of Internet Use	Number of Students who Commented	Total Number of Comments	Percentage (%) of Comments
Searching	0	0	0%
Games	0	0	0%
Research	21	34	51.5%
Email & MSN	0	0	0%
Educational sites	3	3	4.5%
Recreational sites	5	8	12%
Downloading	16	21	32%
Unknown	0	0	0%
Total	-	66	100%

The most common Internet activity noted was research, with 52% of written comments. This is most likely due to the students completing a WebQuest during the data collection period. The second most common Internet activity recorded was 'downloading' with 32% of comments. Accessing recreational sites accounted for 12% of comments, while accessing educational sites accounted for less than 5% of all recorded comments.

Students in Class E used the Internet at school mainly for research, with over half of all comments pertaining to this. These comments generally reported the students' accessing the WebQuest on Cook's voyages. Comments varied in detail from "we started on a WebQuest" to "we were finding information on Captain Cook for a presentation on his voyages". One student was very specific, stating, "I learnt how to download a picture about Captain Cook's first voyage but we still have to work on Cook's other voyages". Another commented:

At school we went on the Internet and we did Captain James Cook's WebQuest and found a lot of information on him. We learnt how to minimise and download pictures. We downloaded a picture of a map of one of his voyages which was his third voyage. We looked at a lot of websites about Cook and they were very interesting things about his voyages. It was very fun as well as last week.

The student's comments relating to downloading were generally related to them learning to download pictures for their PowerPoint™ presentations on Cook's three voyages. One student simply recorded, "we learned how to download pictures from the Internet". Another student commented, "I also downloaded some very good Endeavour pictures. When I downloaded them I stuck them in the info box," (meaning the images were inserted into the PowerPoint™ presentation in the section next to the information).

There were few comments regarding accessing recreational websites which totalled only 12% of all comments. These comments included, "I went on Nickaloden.com.au. I saw

Rug Rats all grown up,” while another student accessed ‘Cheat World’. Other comments categorised as recreational were from students who accessed the Internet from home, with one student stating “at home I went on to Delta Goodrem”.

All the comments regarding accessing educational websites referred to visiting the Ziptales website, an Australian online reading website. Students were allowed to access this website in the class mini lab during class time. This was generally used as part of the class group guided reading program that operated each morning. The teacher planned that one group from the class would read a Ziptales story and complete a specific worksheet set by her at the group’s reading level ability. The group would rotate each day so that all students in the class used Ziptales once per week.

In their e-learning journal the students were given the option to check various boxes to record their patterns of Internet use throughout the data collection period. The patterns showed what days the students generally used the Internet as well as other information such as what search engines they used and who the students emailed.

The students in Class E did not complete the check boxes in their e-learning journals regularly, perhaps because they were not reminded to do so or due to time constraints. Under ‘searching the Internet’ there were two ticks on different weeks to record that a student or students had searched the Internet. The type of search engine used was not recorded.

One area of student use that the students had the option of recording was using the Internet for email. Responses to this category were very low as the students were probably not given access to any email account at school. Minimal records exist of students emailing others. In Week 5, there were two students who emailed an unidentified person and one student emailed a parent. In Week 7, there were also two students who emailed an unidentified person and in Week 10 one student recorded emailing “a friend”.

4.7.4 Home and School Internet Use

In the questionnaire, the students were asked whether they used the Internet more at school or at home. In Class E, from sixteen responses, seven students used the Internet more at home and nine indicated that they used the Internet more at school. The students were then asked where they would prefer to use the Internet. From a total of fourteen responses nine indicated they preferred to use the Internet at home while only five stated their preference was for using it at school. The students gave a variety of reasons for their responses. Three students preferred to use the Internet at home because they got to choose what they were doing, while another student felt they had good “private time on the Internet”. Another student was allowed to stay on the Internet longer at home. The students who preferred to use the Internet at school liked receiving help from the teacher, while another student stated “at school you normally have a mission to accomplish” and this student enjoyed that.

The questionnaire asked the students if at home they used the Internet at home in different ways than at school. Interestingly, twelve students stated yes, while two said no. The student’s explanations for using the Internet at home were varied. These included accessing games websites including ‘cheats’, while two students preferred to access different websites and another three used the Internet at home to “learn things, look up information”. Only one student indicated using a ‘chat’ feature.

In their journal, the students were able to indicate in a check box which days during the week they used the Internet at home. Students reported using the Internet at home for personal use with 66% of their responses indicating this during the term.

The students were asked how they used the Internet for school work at home. The students included uses such as looking up Google to assist with assignments and to download images, with one student stating, "It helps me with my projects and it helps me if I want to download a picture for a title page".

4.7.5 Student Use of Technology

In the focus group interviews, the students were asked if they experienced any problems using the Internet throughout the school term. Students in Class E reported that there were several problems when using the Internet throughout the school term. These problems included technical problems, with one student describing difficulty saving the document she had been working on by stating:

We had to save it and when we did [my partner] clicked on the four squares in a box and she lost all of our work. I had to think [and I saved it] saved it but then [my partner] lost it all.

Another student commented on the lack of time the class had during the school term saying he had "only used it once" during the term. However, this student may have been absent on other days when the students used the Internet.

4.7.6 Student Perceptions on New Skills Learnt

In the student questionnaire the students were asked if they felt they had learnt anything new when using the Internet at school. Fifteen students stated that they thought they had learnt new skills while one student felt he had not.

One student from Class E stated, "I learnt how to minimise programs and how to download pictures from the Internet" while another student commented that he learnt "how to download pictures and do other things using the Internet". Another student was very general in his comment, stating that he learnt "how to get on the Internet".

4.7.7 Student Enjoyment of Using the Internet at School

There were 16 students in Class E who completed the end of term questionnaire and reported enjoying using the Internet at school throughout the school term. Only 2 students said they did not enjoy using the Internet during the term. The students were asked what specifically they enjoyed about using the Internet at school, and most enjoyed learning about Captain Cook's voyages and completing the WebQuest. One student commented:

I enjoyed going to Captain Cook's three voyages. And it was fun going in to the Internet. And going into the WebQuest of Captain Cook's first, second and third voyage.

Other students specifically described enjoying downloading, but many students wrote comments combining more than one topic. An example of this is the student who wrote, "I enjoyed looking for information on Captain James Cook and downloading pictures", while another stated he enjoyed "learning about Captain Cook's voyages, Ziptales and other games". Eight other students also enjoyed using Ziptales, the online Internet reading program. One student stated simply, "I like the Internet because I can look up things".

The students in this class also wrote in their e-learning journals about their enjoyment of using the computers. An example of this is from one student who recorded:

I liked it. We learned how to download pictures from the Internet. I loved it. It's so fun. I wish I could do it every day.

Another student commented in their e-learning journal:

It was quite fun learning all about Cook's interesting voyages. All the things I did were FANTASTIC! I loved it. The picture [my partner] and I went to download next was a picture of Cook's ship. It's called the Endeavour. I had heaps of fun!

4.7.8 Future Use of the Internet

During the first focus group interview the students were divided into pairs, and they asked each other how they would like to use the Internet in the future. Each student then reported back to the group about what their partner said. The group reported various uses, with one student stating "when you get bank accounts you can bank online and you can, like, you can buy stuff online", while his partner said "I'd like to look for jobs and stuff". Two other students said they would like to play more online games, which one student clarified by commenting "harder games, even".

In the final focus group interview, these same students were asked to design an activity that their class could do using the Internet in the future. The intention of the focus group was for the students to be given the task to complete which meant being given an authentic learning task. They were able to relate their activity to the unit of work they had been studying. The focus group students divided into three groups of two to work on this.

One pair decided they would like to complete more WebQuests. This pair also wanted to get more information from Google and Yahoo. To expand on this one student stated he would like to "use the Google thing and then write up and information and explanation".

Another pair wanted to be able to use Ziptales again, as well as to use "online Maths and Maths quizzes". One of the students in this pair expressed that he thought this activity was difficult, perhaps because he had not used the Internet much during the term and was uncertain of how he could use it in the future.

The third group suggested using "www.funkids.com.au", which they described as a site that allows learners to "type what you want to learn about then you find out about it". This group also suggested being able to use the "website games on [the] ABC" website.

4.7.9 Summary of Case Results

Several patterns have emerged from the data gathered from Class E. These patterns include the students most frequently using the Internet at school for research and downloading. These two activities were related because the students were taught how to download images for the PowerPoint™ presentations that they were completing as part of their Cook's voyages WebQuest. This correlates with the students reports that they used the Internet for academic activities at school.

Students in Class E did not record using any particular search engine at school during the data collection period. This may have been because the WebQuest was directed with

suggested web sites for the students to visit and thus searching the Internet was not a skill that was taught during the school term as this skill was not needed at that time.

More than half of the students who completed the questionnaire felt that they had learnt new skills throughout the school term. The students predominantly reported enjoying learning about Captain Cook's three voyages although many also commented at length on learning how to download at school throughout the term.

Again, a large number of students from Class E, (16) reported enjoying using the Internet at school while only 2 students stated they did not enjoy the activities at school. The students generally recorded enjoying using the Internet at school to do with the prescribed task, Cook's voyages WebQuest, and downloading images for the concluding presentation. Students commented favourably on the structured activities prescribed by the teacher.

4.8 Overarching Themes

It is important to be able to draw together the main themes from all the cases. Thus, the cases are not being presented in alphabetical order but with the two most contrasting cases that stand out being presented first. These are Class D and Class B. After these cases alphabetical order resumes with Classes A, C, and E being presented.

This is followed by Section 4.8.6 which discusses themes that are common to all cases in detail. The final section in this chapter, Section 4.8.7, identifies the major areas that are overarching to these common themes.

4.8.1 Class D

Class D stands out in this study for several reasons. These include:

- the scaffolding provided by the teacher for the topic;
- the teacher provided quality teaching using the technology;
- the students appeared to have had a high level of motivation and enjoyment; and,
- the students were given a high level of access to the available technology in part due to a lack of access in the home environment.

The teacher in this class chose activities that provided scaffolding to his students. This sequence of activities on the CAP website provided very specific scaffolding to the students while allowing the teacher to act as a facilitator when teaching with ICT. The scaffolding was provided in two ways, including the teacher providing support to the students where needed, and the way the actual task on the CAP website was structured (as described in the Case). This appears to have led to a more effective learning experience by the children.

Scaffolding was provided to the students in the form of a specific task. Although Class D was studying British colonisation, the class teacher chose to utilise the Country Areas Program (CAP) on 'Convicts of the First Fleet' to teach the students the knowledge they required. The students completed a rich task that required them to make choices about which convicts would be the most useful to them. The task required the students to choose three convicts who had the necessary skills to assist the Governor of New South Wales to run Government House. The students were guided by clear instructions and a downloaded worksheet, which provided a table to use in Microsoft Word™, and using a database search for the convicts with the most appropriate skills to assist them. The students then completed two other worksheets in Microsoft Word™ asking them to provide specific details about the convicts. The worksheets provided richness to the task the students completed and scaffolded the students into learning enough for them to complete the task.

The teacher was also able to scaffold the students by assisting with any technical knowledge they may have needed as well as advising them about how approach the task. This demonstrates how by focusing attention on relevant and timely aspects of each task, the class teacher can highlight aspects the students need to understand and then can break the activity down into a series of smaller tasks, thus providing necessary scaffolding to the student. Yelland and Masters (2007), suggest that the role of the teacher is very important when providing scaffolding and the teacher should encourage students to take risks. Yelland and Masters go on to suggest that teachers who effectively scaffold ensure that students "are afforded the opportunity to maximise their potential and use higher-order

thinking skills to solve problems” (Yelland & Masters, 2007, p. 380). From the data collected is evident that the class teacher in this class was able to provide this type of scaffolding. As part of the task, the students presented an oral report on their findings. The students were able to use PowerPoint™ to support their oral report. However, PowerPoint™ was used as a presentation tool rather than to produce a final product.

Another factor was the quality of the teaching using technology that was provided by the class teacher. He appeared to be very comfortable with teaching and he demonstrated this with the flexibility of this approach. For example, when there was no Internet access across the public school system, the teacher in Class D directed the students to continue with non-Internet related activities. This teacher’s description of his teaching was consistent with a facilitative approach, which meant he acted as a guide in helping the students to “explore their own self-knowledge” (Gregory, 2002, p. 82).

The focus group interviews and questionnaire data indicate that students in Class D were very motivated when completing the set tasks. They also all enjoyed using the Internet as part of their class activities and nearly all (90%) of the students felt that they learnt new skills. A very small number of students in this class used the Internet at home (5%), which is an extremely low number. This is indicative of the low socio-economic area in which the school is situated as in Australia 64% of all children aged 5 – 14 accessed the Internet either during or outside of school. From this it has been estimated that 79% accessed the Internet at home (Australian Bureau of Statistics, 2003).

This class was in the school in the lowest socio-economic area in the study. As such the school recognised that there was a lack of computer and Internet access at home. To address this problem, the school invested time and resources over a number of years to develop ways of ensuring that the students had a high level of ICT access. This included networking all the computers in the school and, more importantly, ensuring that students had extensive access to these computers. Class D had a computer in the classroom that the teacher allowed students to use throughout the week. The students also went to the library once a fortnight where they completed lessons on the library computers with the school librarian. In addition to this, Class D was the only class in the study in which a specialist information technology RFF teacher taught once a week for specific skill based lessons. This then allowed the class teacher to assume the role of the facilitator when teaching the class in the computer laboratory. These factors combined suggest that the school Class D was located in had identified several factors limiting student use of ICT and had put in place various programs to overcome the limitations. It appears these programs were well developed, and well supported using exemplary practices.

4.8.2 Class B

Class B stands out in ways opposite to Class D. These reasons include:

- the lack of scaffolding, direction and specific teaching conducted by the teacher;
- high student use of the Internet at home; and,
- the low access students were given to the available technology at school.

There was a lack of specific teaching in the Internet ‘scavenger hunt’ and in fact this unit was never directly taught. During the final interview, the class teacher cited several reasons for this. For example, he was unable to find a suitable time in the week for his class to visit the computer laboratory. This suggests the class teacher had an inability to embed the Internet ‘scavenger hunt’ activity into his class teaching and learning program, and this activity appeared to be an adjunct to class activities. Instead, he provided the

students with a list of websites on the topic that the students could access outside of school hours. The websites were listed on the class chalkboard for the class to record. By just listing the websites on the chalkboard the teacher was giving the students no real support for the task and no scaffolding, which is the opposite of the support the students in Class D were given. The students in the study did not report whether these websites were actually discussed in class at a later time, although it appears not. This suggests poor follow up from the class teacher.

There was high student use of the Internet at home for Class B, perhaps due to the students being given suggested websites to access out of school. Subsequently, this class recorded the highest use (60%), of any class in the study, of the Internet at home. A high number of students from this class also preferred to use the Internet at home, perhaps because they had a lack of access to technology at school. This school was the highest socio-economic area in the study which may have meant that more students had computers at home with access to the Internet.

Although the school had a high level of technology infrastructure, the students were not able to utilise this technology to its maximum potential. The students had access to a shared class mini laboratory, as well as the teacher's computer in the classroom. Although the computers were available the students were rarely allowed to use them. This was perhaps because of supervision issues with the shared mini laboratory. The class also had access to the computer laboratory in the library and was booked into this laboratory for one hour per week, although this time was rarely used. They did, however, go to the laboratory for one hour per week during the class RFF time with the specialist computer teacher. These lessons were not linked to the class teaching and learning program specifically, but were related to skills needed in mathematics using the Microsoft Excel™ software, which did not use the Internet.

In spite of the high level of ICT infrastructure available to these students, they were denied guided and supportive access at regular times. This is in stark contrast to Class D, where the students had a high level of infrastructure with high access and a high level of Internet use, as well as scaffolded support.

4.8.3 Class A

Some particular issues and themes emerged from Class A. These include:

- having unique (to this study) access to technology in the school;
- the students had a high level of skill;
- the students completed an open ended activity;
- computers were used as a tool and integrated into class learning activities; and,
- student use of the Internet at home was largely personal with a very limited amount of academic use.

The students' access to technology in this school was quite different to that of students in the other classes. This access was unique because no other case had similar access or infrastructure and this allowed the students to use the technology in a different way. This was the only school in the study to use Apple Mac computers and the only school to have laptops for student use. These laptops also had wireless access to the Internet.

The students in this class had attained a high level of skills. This was perhaps because the students had a high level of access to this ICT infrastructure and it was also used on a regular basis, which is suggested by the fact that only 30% of the students in this class

reported learning new technical skills. This could have been because the students were given access and used the computers over a long period of time, thus enabling them to acquire more extensive computer skills. The class teacher had previously taught the students to search using Google and conduct research utilising the Internet, and the students in this class had also completed PowerPoint™ presentations previously. Thus, the purpose of this activity was not to teach technical skills, but to study the content being taught.

The teacher designed an open ended activity. He had previously taught Google searching to the students and he relied on the fact that students had good technical knowledge that allowed them to search for and subsequently research a famous person. The teacher acted as the facilitator for this class. His approach typifies the way many teachers prefer to teach their classes. He had the “skills to create conditions within which other human beings can, so far as is possible, select and direct their own learning and development” (Gregory, 2002, p. 80).

This class teacher used the computers as a tool and integrated the use of ICT into class activities. The students were given a task to research a famous person, which could easily have been completed using reference books and handwriting a report. This teacher, however, asked the students to complete research on the Internet and then create an electronic PowerPoint™ presentation. Thus, this topic was completely integrated using ICT as a tool. The integration of this topic was aided by the fact the students had laptop access, removing the need to move to another location to access computers and the Internet. This saved the class time as well as adding to the flexibility of teaching and computer use.

Almost half the students in this class used the Internet at home, for personal purposes 90% of the time. The students were given homework using the Internet, but this accounted for only a small proportion of Internet use. Other students accessed the school library computers, while several students used the public library computers to complete this work.

While the Class A teacher used the Internet efficiently with the students, this teacher largely failed to extend the students technical knowledge. This could have been achieved by integrating the teaching of new technical skills with the teaching of new content. For example, perhaps the students could have created a website on a famous person, thereby learning the technical knowledge involved in creating a website as well as the content knowledge required. Scaffolding could then have been used to provide support for the students when learning new technical skills.

4.8.4 Class C

This case differs from both Class A and the other cases. The themes that emerged in this class are:

- the topic was event driven and not actually linked to a syllabus topic;
- the teacher decided to teach an open ended activity;
- the focus of the activity was to teach the students content knowledge;
- many students reported learning new skills; and,
- more access to technology at school was needed as many students did not have access to technology out of school hours.

The topic for this activity was event driven, unlike activities in all the other classes in this study which were content driven. In the year of the data collection the Olympics were held, so Class C's Relief from Face to Face teacher decided to take advantage of this to enhance student learning. Although other classes linked their units to the Human Society and Its Environment syllabus, this class did not. As this activity was event driven it was linked to the syllabus in a different way. The teacher chose to study the event, and then the activity was linked to the Key Learning Area of English utilising English syllabus outcomes.

The class teacher chose to teach this topic in an open ended way. Although the final task, the PowerPoint™ presentation, was a set task, the students had options in choosing the sport to be studied, what to include and how to obtain this information. The teacher acted as a facilitator in this activity by giving the students the task, and allowing them to complete it at their own pace over a number of weeks. She circulated around the room and assisted students when they needed help or clarification.

The focus of this activity was to teach the students about an Olympic sport that was unfamiliar. Although the focus was on knowledge, 58% of the students reported learning new technical skills. This shows that the teacher was aware of the differing abilities of her students and provided opportunities for the students to learn new skills and to consolidate the ICT skills they had already learnt.

This class was situated in a lower socio-economic area than that of Class B, and only 42% of the students reported using the Internet at home, however, only 4% of respondents used the Internet at home for school purposes. As the students had limited access to ICT at school, just once per week as a class, it is possible that students need to be given more access during school hours. The class computer also appears to be under utilised during school time and the students could well have benefited from increased access.

4.8.5 Class E

The story emerging from Class E is quite different to those of other classes. As this class was in the same school as Class B, perhaps the reason it is different is because of factors such as having a different class teacher and the students beginning to use more technology at a younger age. The class also benefited from the RFF teacher using the Internet for the one hour weekly computer RFF session. This was also the school in the highest socio-economic area of the study, the average bracket for the state. Some interesting aspects have emerged from the Class E data:

- the teacher directed activity may have scaffolded the students to learn new skills;
- student enjoyment of Internet related activities, although still high, was the lowest of any class;
- the students were often asked to do school related Internet activities at home; and,
- student access to technology at school was limited.

The activity the students completed during the school term was teacher directed with the teacher providing specific scaffolding for the students in relation to the activity. Although the class utilised the CAP website to study the ships of the First Fleet, the activities were very much teacher directed. This meant the teacher provided direct instruction for the students using the computers, and specifically the Internet. Direct instruction was used because the teacher felt that at times it was necessary, perhaps because the students were younger and with fewer computer and Internet skills. Direct instruction can be used when the teacher wants the students to "complete a process in one particular way" (Bobis,

Mulligan, Lowrie, & Taplin, 1999, p. 345). In this case the teacher felt that the students would benefit from having direct instruction to avoid confusion when learning new skills as a more step by step approach could be used.

Most (94%) of the students in this class reported that they learnt new skills, the highest of any class. This may have been because the students were younger, (Years 3 and 4 compared to the other classes of Years 5 and 6, except Class D, which was Year 4), and did not already have these skills. Or it may have been because the activity was teacher directed and the teacher was able to scaffold the students to learn more new skills.

This class expressed the lowest level of student Internet enjoyment of all classes and, although it was for 88% of the class, perhaps fewer students enjoyed using the Internet at school because more students were learning new skills and thus found it a little more difficult. This may also be the reason the RFF teacher directed the students in their lessons. Another reason for the low level of enjoyment may have been the students only completing limited tasks using the Internet.

Only 44% of students reported using the Internet at home, with 66% of these students using the Internet at home for personal use. This was perhaps because the students in this class were younger and their parents did not allow them to use the Internet while at home or there were other limitations, such as more competition for computer access.

Student use of ICT in this class was lacking. As this class was located in the same school as Class B, ICT infrastructure, availability and use were similar. The infrastructure was the same as for Class B, with this class also having access to a shared computer mini laboratory and a school computer laboratory. Although these students did not complete the class teacher's set task, they did access the school computer laboratory with the RFF teacher to complete a WebQuest on Cook's voyages. Students also accessed and used the class' mini computer laboratory. This meant that the students had higher use than Class B students. The class teacher was not at work due to ill health and the casual teacher did not use computers when teaching this class which was why the students did not complete the tasks set by the class teacher.

4.8.6 Themes Common to all Classes

There are several themes evident in the data from all of the classes. These themes are:

- the classes used the Internet for accessing information;
- the classes used one particular search engine most frequently;
- lack of professional development opportunities;
- there was one common technical limitation for all students; and,
- the teacher involved in the study for three of the cases was the school computer coordinator.

One of the main functions of the Internet is being able to use it to access various websites for information. In this study, students from all classes reported using the Internet to access information at school. All classes except one reported extensive use of the Internet for research throughout the data collection period. Over 30% of all student comments from Classes A, D, and E pertained to research and for these classes this was the topic most commented upon; 17.3% of Class B student comments were on research and it was their second most recorded topic. However, Class C only recorded 7.3% of research comments and this was ranked sixth most recorded. There may have been several reasons for this including the focus of activities taught by the class teacher or

perhaps the limited amount of time available to access the Internet on the school computers. Classes D and E were the two younger classes involved in the study and their class teachers were more directed in the lessons with less time available on the computers compared with the other classes. These two classes also had the highest percentages of students stating that they had learnt new skills with 90% and 94% respectively. Perhaps this was because the students were closely directed in their computer and Internet use by their class teacher and were scaffolded more closely in their learning.

The students from all classes had a general reliance on and preference for using one particular search engine. When using the Internet it was common for the students in all classes, except Class E, to search using only one of the many search engines available. The search engine used by these classes was Google. Class E, which was a younger class, had a number of students also using the Yahoo search engine.

There was a lack of teacher professional development opportunities for the teachers involved in this study. It was evident that this was not just throughout the period of the study, with teachers reporting they had not been given many opportunities for professional development in teaching with ICT throughout their teaching careers.

All classes in the study had one main technical issue in using the Internet during the period of data collection. This was due to a New South Wales Department of Education and Training departmental policy of blocking Internet access for all public schools in the state due to problems with searching filters when the Department realised that students could complete image searches on inappropriate content. The New South Wales Department of Education and Training felt this was an extremely important and sensitive issue and so immediately stopped all Internet access at all public schools until their search filters could be modified to prevent this from happening. This caused disruption to all schools, but the class teacher who appeared to cope most easily and was able to work around this disruption was in Class D in which the students had the greatest access to the Internet while at school. The students were able to complete non Internet related computer activities until the Internet was available once more.

At three of the schools in the study the main teacher involved was the school's computer coordinator. For Classes A and D the computer coordinator taught a year level class within the school. The computer coordinator for Class C was the school's computer RFF teacher, thus she was the main teacher in the study. For Classes B and E, the study focused on the class teachers, who were not the computer coordinator. The RFF teacher at this school fulfilled the computer coordinator role and as such taught the students in the studied classes. However, the students in Class B did not use the Internet during computer RFF, although the students in Class E did.

As can be seen from the above discussion these themes are common and important to each case. Although every class used the Internet to access information in various ways and for Internet searching, it was often used in a way that seemed incidental to the class teaching and learning program. This may have been in part due to the lack of teacher professional development reported by each teacher involved in the study.

4.8.7 Other Major Themes

This chapter has described each case and the emerging themes that are specific to each class. These emerging themes relate to three areas common to all classes:

- ICT infrastructure;

- computer access; and,
- computer use.

The overarching theme of ICT infrastructure shapes each case, because put simply ICT infrastructure involves what was available in each school for student use. This included not only the hardware and software but also how the specialist computer support teacher is utilised, the network infrastructure and the type of Internet connection. Two classes, A and D, had an Apple Macintosh network, while the other schools had Windows networks. All schools had broadband Internet access which was supplied by the New South Wales Department of Education and Training. Although the infrastructure varied at each school it greatly affected the students in each school because without necessary infrastructure there would have not been any available Internet. ICT infrastructure was often out of the control of the class teacher and the students in the class. A high level of infrastructure was apparent when the school had a well developed network, computers that generally functioned had a well utilised computer support teacher and software that was used in an educational way.

A second theme relevant to all cases was the available computer access. This varied for each class with schools giving students access in a variety of ways. These included schools utilising a specialist computer teacher (Classes B, C and E). All schools had a least one or two computers per classroom while one school (Classes B and E) supplied mini laboratories which were adjacent to the classroom. Students in Class B were not allowed to use the mini laboratory often, due to lack of teacher supervision. Students in two schools were able to use computers during library lessons (Classes A and D). Only one school provided laptops for student use (Class A). The availability of computer access was extremely important to each case as this also determined how students were able to use the Internet at school.

Although schools provided a variety of places to access the computers, not all schools were able to utilise their computers to their maximum potential. All schools had computer laboratories, although they were used in different ways. Some laboratories were used by class teachers (Class D and occasionally Class E), while other laboratories were used only by specialised computer teachers (Classes B, C and E). Other schools had a specialised mini computer laboratory (Classes B and E). Additionally, Class A's computer lab was located in the library with the librarian having control over this area. The students in Class D had access to computers in the library as well as a computer laboratory located elsewhere in the school. It is important that students have both a high level of infrastructure as well as access to this.

The third theme identified was student computer use. Students were able to use the computers in a variety of ways, depending on the class teacher and the specialised computer teacher. Due to constraints and other factors, described earlier in this chapter, this varied among the classes. For example, Class D students were able to use computers in multiple locations in different ways to complete a variety of work. This allowed for the Internet to be integrated successfully into the curriculum. For the other classes how the teacher chose to allow the students to use the computers varied greatly, with one class not using the available computers often and other classes using them in ways that were not integrated into the curriculum. Computer use is perhaps as important as computer access. This is because without access it is impossible for the students to be able to use the computers.

Some schools had a high level of infrastructure but the students were not given access to the computers, while other had high infrastructure and allowed access but did not use the computers available very effectively. The most successful class was Class D and this class had all three: good or high infrastructure, access and use.

Thus, as has been discussed above these three themes, ICT infrastructure, computer access and computer use, are integral to the students and teachers in this study. It is imperative that students have good infrastructure, appropriate computer access and pedagogically sound computer use in order for them to have exemplary ICT learning experiences.

4.9 Conclusion

This chapter presented the analysis of the data collected in this study. Each case was presented in a structured and ordered way that was the same for each of the five cases. The data collected from the teacher was presented initially and then the student data was presented. Section 4.8 then presented the overarching themes with each case being offered separately. Several themes common to all classes have then been teased out, with three other major themes finally being discussed. The next chapter relates these themes to the research questions.

Chapter Five

Discussion, Implications and Conclusions

5.1 Introduction

The introductory chapter of this book includes the aim, purpose and significance of the study, as well as the theoretical perspectives which formed the study and the research questions posed. Chapter Two then reviewed the literature on using information and communication technology (ICT), particularly the Internet, in the classroom and the barriers to using the Internet. Chapter Three revisited the research questions and described the research methodology used in this study. The five cases were then described in Chapter Four with a short discussion and the overarching themes discussed towards the end of the chapter.

This final chapter reflects on how the research questions can be answered from the cases described in this study. Recommendations are made, accompanied by suggestions about how such changes could be implemented. Directions for future research are suggested and, finally, conclusions from this study are presented.

From the end of the last century there has been an increasing emphasis on integrating ICT into the curriculum. Technology skills and knowledge have been included in the 2002 – 2004 Strategic Directions of the New South Wales Department of Education and Training (2002b) and all key learning areas in the NSW DET curriculum. However, it is documented that teachers struggle to integrate technology into the curriculum (Bitner & Bitner, 2002; Ertmer, 2005; Jones, 2002; Royer, 2002). The purpose of this study was to explore how teachers use the Internet to enhance both classroom teaching and student learning in the classroom. The study investigated the types of Internet activities integrated by the classroom teacher into the class learning activities, and examined the learners' experiences of the activities as well as the teachers' rationales for using particular Internet resources. It was found that although each class was unique in its nature there were some themes common to all. These included:

- all classes used the Internet to access information;
- technology was generally integrated into class teaching and learning program and as such this was effective;
- the students predominantly used one search engine; and,
- generally the teacher involved in the study was the computer coordinator for the school.

The following research question was structured to guide the study:

How is the Internet used to enhance teaching and learning activities in the primary classroom?

The question was broken down into the following sub-questions:

1. How does the class teacher use the Internet to support teaching and learning in the primary school classroom?

2. How do students use the Internet both in school and in their everyday lives?
3. What impact does ICT availability have on the use of the Internet in the classroom?

This chapter will address these research questions. The sub-questions will be answered first, which will ultimately lead to the answering of the main research question. These questions are answered in relation to the results of this study and compared with other relevant findings from the literature.

5.2 The Findings in Relation to the Literature

5.2.1 Research Sub-question 1: *How does the class teacher use the Internet to support teaching and learning in the primary school classroom?*

The class teachers in the study used the Internet as a tool for teaching and to access information. The Internet was generally integrated into the class teaching and learning program and was often used by the students to research a topic. Generally, the teachers used a variety of resources to support their teaching, such as the Country Areas Program (CAP) website and other New South Wales Department of Education and Training sites. These websites appeared to be well written to provide scaffolding the students, as reported in Section 4.8.

Throughout the school term each class teacher focused on teaching the students content pertaining to various topics. This was done by the students researching a particular topic on the Internet and then completing a specific task. Importantly, the class teachers chose to teach this content supported by ICT. Specifically, the Internet was used as a tool for research by integrating this into the class teaching and learning program.

It appears that the teaching of ICT skills was incidental to the student learning that took place. That is, generally, the main focus was not on the teaching of ICT skills within the classes, but the use of the Internet was integrated through teaching knowledge on a particular topic. This curriculum content focus appeared to be effective both in use of time and the teaching of skills. Teachers today respond to what is described as an overcrowded curriculum by integrating both skill based development and knowledge. Four of the teachers in this study successfully achieved the integration of ICT skill based development and content knowledge while attempting to allow their students maximum possible access to the Internet. This approach is recommended in the curriculum, with the New South Wales Board of Studies creating integrated curriculum units of work (Board of Studies NSW, 1996). Jonassen et al. (1997) also support this approach by suggesting using an authentic learning approach involving knowledge and skills development which engages students and promotes high level thinking processes.

All teachers involved in this study used a variety of resources on the Internet to support their teaching. Two classes used a specific website called CAP, while one teacher utilised a search engine for the students to access various websites. In this study the two teachers that used the CAP website were the class teacher from Class D and the computer RFF teacher who taught Class E for one hour per week. The CAP website attempts to enhance learning outcomes for students who are geographically isolated so that their learning outcomes are equal to students in the rest of the state (Early Childhood Primary and Rural Education Directorate, 2001). However, the website is available for use by the general public and is popular among teachers in many New South Wales schools. The CAP website promotes quality teaching and learning with the integration of technology

(Early Childhood Primary and Rural Education Directorate, 2001). The research modules are designed so that students use the Internet not just to gather information but also to select, analyse, and organise this information to provide answers or solutions to questions and/or situations (New South Wales Department of Education and Training, 2001).

The CAP website is an excellent example of the ready made resources available that are relevant to the New South Wales curriculum and this study exemplifies how some teachers are able to use these resources within their classrooms. The fifth teacher simply recorded on his chalkboard the Internet addresses relating to the topic being studied throughout the school term. Although this may not have been the most appropriate way of using the Internet in a teaching environment, this teacher may have thought he was still attempting to use it to meet his students' needs, as were the other class teachers.

The cases in this study demonstrated several models of integrating teaching with the Internet into the primary school classroom. The class that appeared to have been most successful in this type of implementation was Class D in which the class teacher used all available computers with flexibility and to the class' best advantage. This class teacher taught content based lessons through the use of a particular website, the CAP website, and the teacher utilised both the computer in his classroom and the school computer room in a highly effective way. The class also used computers with the RFF teacher in a weekly skill based lesson and with the school librarian, thus maximising student exposure to ICT in a well thought out, integrated, and coherent way. Importantly, these three teachers all worked collaboratively to ensure effective learning.

Robertson, Fluck, Webb, and Loechel (2004), suggest that teachers already using a model of best practice of good teaching and resource management will make best use of ICT in the classroom. Class D also had the benefit of good teaching practice through the teacher's scaffolding of the children's learning activities. This was complemented with having an RFF teacher who conducted specific skill based lessons. The class teacher also demonstrated excellent interpersonal skills which Robertson, Fluck, Webb and Loechel (2004) also suggest are important to achieving successful ICT best practice.

It is important to note that in this study each school had an appointed computer coordinator. This person had the responsibility to ensure the smooth running of the computer laboratories and provide support for teachers who were integrating ICT into their teaching and learning programs. The computer coordinator also facilitated the class teacher's use of the Internet, through guidance and encouragement. In this study, the school computer coordinator did play a major role and three of the teachers involved were also in the role of computer coordinator at the school. In the other two cases the computer coordinator still taught the students computer skills as part of computer RFF, potentially complementing the activities set by the class teacher. Lai, Trewern, and Pratt (2002), contend that the ICT coordinator is in a position to play a major role in the planning and implementation of technology integration in a school. The role of the school computer coordinator may be an area that needs further exploration to further extend the work of other researchers (Lai & Pratt, 2004; Lai et al., 2002). In the classes in this study the computer coordinator contributed to the way the teachers used the Internet for teaching and learning in the classroom, as a research tool, where the students were required to find information to complete specific tasks.

Thus, the teachers involved in this study were using the Internet in various ways to support teaching and learning in the classroom. This was through the use of Internet resources such as the CAP website and other educational websites. In two cases teachers

integrated the content of their ICT teaching into the class teaching and learning program to provide a more integrated approach and to support teaching and learning in a more holistic way.

5.2.2 Research Sub-question 2: *How do students use the Internet both in school and in their everyday lives?*

As a result of this study it can be concluded that students used the Internet in different ways when at school compared with use in their everyday lives, which was usually at home. Students largely used the Internet for research while at school although it was also used in various other ways, such as for downloading and email. While at school, students were often required to learn collaboratively by working together to conduct their research as fewer schools were able to provide one computer per student and, students were required to share computers. This is not necessarily a negative practice as this is consistent with the view of one group of researchers that when students learn collaboratively students are engaged in their learning (Fly-Jones et al., 1995). From this study it can be concluded that this is a positive factor in creating an effective learning environment.

Not all students had access to the Internet at home, while some students used the Internet at home to email others. The main home activity was to play games that students were not allowed to access at school. Though not all students reported having access to the Internet at home, between 42% and 60% of students stated they used the Internet there. The only exception was in Class D, where only 5% of students used the Internet at home. Students who did have access reported using the Internet in a variety of ways, such as accessing games at home that cannot be played at school, locating 'cheat' websites to assist with playing the games, and using the Internet for academic purposes. Generally, students also used the Internet for downloading and to communicate with friends through email and 'chat' programs.

Some educational commentators claim that students today are sophisticated technology users and are part of the 'net generation' as they have grown up using the Internet and technology in the home. Prensky (2005a) states that the children of today are using the Internet to access eBay, visit music sites, and use Moodle etc. As is demonstrated in this study this is not necessarily the case. Not all the students in this study could be seen as the 'net generation' due to their lack of access to the Internet, with between only 5% and 60% of students in the study indicating that they use the Internet at home. This was particularly true of Class D students, the majority of whom could not access the Internet anywhere other than at school.

Table 5.13 revisits the SIEFA data that has been used in this study (see Section 3.5.1 for further explanation). It was obtained from the 2001 census with the schools in South Western Sydney having a SEIFA of 944.64 and 1001.2 for socio-economic Advantage/Disadvantage, both below the state average. The Wollongong schools had even lower SIEFA's of 885.44 and 868.24. These schools were in approximately the lowest 10% of the state for Advantage/Disadvantage. The advantage and disadvantage figure was measured by the Bureau of Statistics by taking into account variables such as education, income and occupation as well as living conditions, wealth and access to services.

Table 5.13 also draws together the use of the Internet at home, the SEIFA data and the preferred location of using the Internet.

Table 5.13 Student use of the Internet at home, SIEFA data including a socio-economic indicator and home as the preferred location for all classes.

	Class A	Class B	Class C	Class D	Class E
SEIFA Data State Average - 1011	944.64	1001.2	868.24	885.44	1001.2
Socio Economic Indicator	Below Average	Just below average	Low	Low	Just below average
Home as the preferred location	56.5%	79%	83%	20%	64%
Use of the Internet at home (% of students)	48%	60%	42%	5%	44%

It is possible that students who did use the Internet at home may have developed a different set of skills than those learnt at school. This was because of the limited ways the students used the Internet at school for academic purposes. They did, however, use the Internet for leisure activities at home. In other words, use of the Internet by these students at home to download ring tones or music, play online games, and email to contact friends and family, were unlikely to assist students to develop many of the skills they need to use the Internet for academic purposes. For example, skills more closely related to information literacy, such as the critical evaluation of websites and online resources, were not being developed at home.

Interestingly, the number of students who preferred to use the Internet at home varied greatly between classes. The class with the lowest number of students who preferred to use the Internet at home was Class D, with only 20% of students reporting this. This may have been because of the low access these students had to the Internet at home as the percentage of students in the other classes preferring to use the Internet at home ranged from 56.5% to 83%. With greater access at home it is possible these students were more comfortable using the Internet at home and so enjoyed it more than the perhaps restrictive class environment.

Students used the Internet in their everyday lives, at home and other locations if it was available to them. They reported using the Internet at places outside of home and school, such as the library or at relatives' or friends' houses. When students used the Internet outside school they also appeared to be learning new skills, both from each other and through trial and error, which was indicated by the students during student interviews. This suggests that students will learn skills they need outside of school even if they are not learning them in school. It also suggests that they are interested in using computers in their everyday lives for both academic and personal purposes.

Student use of the Internet varied from class to class, however, research featured predominately in the way the students used the Internet for academic purposes. Research featured prominently in four of the classes, with one of the younger classes not using the Internet for searching. Students were often required to conduct searches using the Internet, for which the search engine of choice was 'Google', referred to as the search engine that 'everyone' chooses (ABC Radio National, 2006). The use in this study appears to be consistent with general usage across Australia. For example, in Australia, Google has approximately 7.5 million users while reaching approximately 70% of all Internet users in this country (ABC Radio National, 2006). The Google search engine is easy to use and is able to deliver most information that is needed (Gorman, 2006) although it does not contain all information. This use of the Google search engine can be referred to as Googlization, and can lead to a reliance on information obtained from this one search engine; which may not provide the best information for the user.

The Google search engine revolutionised searching on the Internet as the search algorithm on earlier search engines based the searches on how many times a word was located in a website. This allowed website creators to hide words to improve their success rate of appearing in a search. Google created an algorithm where a search algorithm searches for answers to questions using a development called page rank. This is where the web crawlers looked at what was written on the page as well as how other pages were linked to it (ABC Radio National, 2006). This prevents websites giving false information and increases the accuracy of the search. However, Google and all other search engines have not indexed every single website on the Internet and thus all are limited in their accuracy in their scope of searching.

This study found that the use of email may also have enhanced student learning, although this was incidental learning at home and not at school. Although no class was provided with direct instruction in using email during the period of data collection, between six and ten students from each class used email, generally at home, to email friends and relatives. The literature provides us with a number of arguments as to why students use email. Two main reasons include speed (Kurland et al., 1997; Tunstall, 1999) and ease of use (Tunstall, 1999; Wyld & Eklund, 1997). The students who learnt and used emailing skills appeared to have learnt them from sources other than formal instruction and not through using email at school. This is perhaps because emailing is often not taught in New South Wales public schools due to constraints in using it as students and staff are not issued with departmental email accounts. Teachers find it can be problematic setting up email accounts for all students in a class and it can be difficult to filter spam email from generic online email accounts, such as 'hotmail'.

Thus, students used the Internet in a more formal and structured way in schools than in their everyday lives, such as at home. This is evidenced here by the nature of the activities in their different settings. In this study, the students used the Internet at school for structured research, while at home; the students used it for recreation and social activities.

5.2.3 Research Sub-question 3: *What impact does ICT availability have on the use of the Internet in the classroom?*

The results in this study demonstrate that the availability of ICT infrastructure of the school has an effect on the use of the Internet in the classroom beyond the provision of computers and networking. Other factors include access, the nature of teachers and

learners to the technology, and how this technology is used. The three areas of ICT infrastructure, computer access and computer use are related linked and dependent on each other as demonstrated in Figure 5.4.

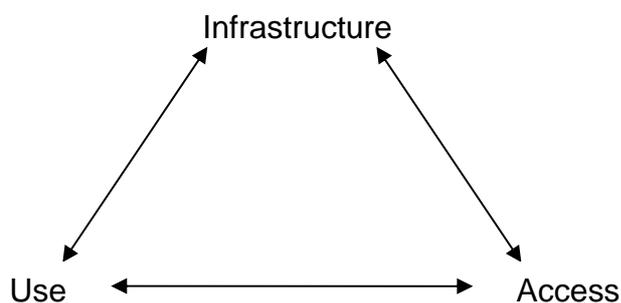


Figure 5.4 The relationship and interdependence of ICT infrastructure, use and access.

Even though the students in all the classes had access to a reliable ICT infrastructure, the available ICT was not always used in the most effective way possible. In this study, access to the technology was dependant on the choices made by the teacher as well as other factors that occurred in the school context. For example, the interruption by compulsory school activities as well as teacher illness disruptions which often mean students would not be allowed access to computers that were normally available to them,

The students from each school in the study had varying amounts of access to the available technology. This ranged from the class that had good access and went to the computer laboratory each week as well as using the library computers and the computer in the classroom (Class D), to the class that were unable to gain much access to the school computer laboratory and the class mini laboratory (Class B) due to reasons justified by the class teacher. This had an impact when using the Internet in the class context as students who were given less access could not utilise the Internet to its full potential. This demonstrates that the best ICT needs to be coupled with the best access and effective use of the Internet as discussed in Section 4.8.7.

Another factor in how ICT availability has impacted on this study is the way Internet technology is used in the classroom in a pedagogically sound way. The data in this study showed that one reason why teachers don't consistently use the Internet in their teaching is because of the various barriers they encounter. These barriers have been well documented including issues with limitations to ICT infrastructure available (BECTA, 2004; Lim & Khine, 2006). Another barrier was a lack of time to implement the use of the Internet within the classroom, which the teachers from Class B and Class E particularly found problematic. This issue is also evident in the literature indicating time restrictions are a common barrier to teachers effectively integrating Internet technology into their class teaching and learning programs (Cuban et al., 2001; Gibson & Oberg, 2004; Zakopoulos, 2005). Some schools were able to overcome these barriers and were thus able to more successfully teach using the Internet. These schools used various models where computers could be successfully integrated into class teaching and learning programs, such as relating Internet use to skills the students have not yet learnt in a meaningful way. The final barrier to integrating ICT into the teaching and learning program was a lack of professional development opportunities, reported by all teachers in this study. Webb, Robertson, and Fluck (2005), argue that teacher professional development programs need

to specifically focus on developing the ICT skills and knowledge of teachers while focusing on practices that will specifically be used in class teaching programs.

Thus, this study demonstrates that availability of ICT infrastructure, access and ICT use are all vital for overcoming barriers in the implementation of ICT in teaching. For example, as was presented in Chapter Four, the ICT infrastructure enabled the teacher from Class A to have the flexibility to use wireless technology with his class while in the classroom. This was something that the other teachers did not have access to. Although technology availability is extremely important, this study has demonstrated that it is also important that students be allowed access to the infrastructure and well as pedagogically sound use of the technology as demonstrated in Class A.

5.2.4 The Main Research Question: *How is the Internet used to enhance teaching and learning activities in the primary school classroom?*

In this study, the main focus of the class teaching and learning activities in using the Internet and its resources was to develop the research skills of students. A secondary use was for students to access content resources. The majority of these teachers used the Internet as a tool for this purpose. This is in keeping with the argument that the Internet can be used “as a resource for the identification, evaluation, and integration of a variety of information” (Relan & Gillani, 1997, p. 43). This use is typified by the students in this study in completing specific research tasks. In order for the students to satisfactorily complete this assigned task, mastery of research skills through Internet use was necessary. The teacher structured the learning activity in a way that this could occur and then followed up the activity by assigning a non-Internet related task. For most of the classes in the study this was the creation of a PowerPoint presentation on their research topic, with the exception of one class where students were required to complete an oral report. Thus, teachers used the Internet as a tool for students to investigate specific information in order to complete the final task.

The literature suggests that using the Internet as a research tool to support student learning can be valuable. In one study, Gibson and Oberg (2004) conducted research in Canada with Years 5, 8 and 11 teachers who reported that students used the Internet for both research and as a tool for student learning. Importantly, Gibson and Oberg (2004) expressed concerns both that the Internet was not being used in innovative ways, and about how well the Internet was integrated into the class teaching and learning program. A strength of the teachers who participated in the current study was their ability to integrate the Internet into the class teaching and learning program. This research extends the existing literature by describing this integration.

While this study reveals that the students used the Internet for research it is important to remember, as Heil (2005) and Herring (1999) highlight, the importance of students needing good critical evaluation skills to ensure that they are discriminating users of the Internet. While this research did not focus primarily on critical evaluation skills, some teachers were aware of the need to teach these skills. One teacher, in particular, focused his teaching on the importance of correct Internet searching and knowing how to make judgements on the information found.

On examination of the data gathered here it has become apparent that these teachers attempted to enhance student learning by catering for a variety of student needs. This appears to have been undertaken by teachers’ knowing the needs of the students in the

class and specifically building on their student's knowledge, technical skills and generic skills. Interestingly, the majority of the teachers in the study created a class learning atmosphere that was conducive to student centred learning. They did this in various ways; for example, Class D used the computer Release From Face to Face (RFF) teacher to teach the students technical skills so that the class teacher could focus on the content base of the lessons. The Class A teacher scaffolded the students to improve their ability to search using Google. Class B was the only class that did not create a student centred learning environment and that teacher did not teach using the Internet.

The role of the teacher was that of a facilitator assisting with catering for the diverse needs of the students in three of the classes. Facilitators need to have both respect and sensitivity for the students in a class to assist the students when controlling their learning (Anderson, 1995). This role of the teacher as facilitator is also considered by Wyld and Eklund (1997) who see that the Internet used for teaching and learning activities in the classroom provides opportunities to teachers to support students in their individual learning needs and this then allows students to develop skills that are relevant to ICT. Robertson and Fluck (2002) have suggested looking further into teacher's perceptions of moving from direct instruction to the facilitative continuum when teaching ICT.

It appears that in three of the cases the teachers often acted as a facilitator to the students, while in two cases the teacher chose to use a more teacher directed approach. In these cases it appears that the teachers were familiar with the students in adjusting their teaching styles and teaching in a way that would best meet their students' needs. In this study it appears students were successful, as Arif suggests, in adjusting "their learning strategies to meet the challenges" (Arif, 2001, p. 2), of using the Internet as a tool for learning. The two teachers who used a directed approach were able to identify what skills and knowledge their students needed to learn and then generally gave the students greater access to the technology so they could learn the skills and knowledge identified.

The Internet was used in various ways by these teachers to enhance teaching and learning in their classrooms as students completed the tasks designed and, to meet the different needs of their students.

5.2.5 Implications of the Study

There are several implications which emerge from this research. These relate to: challenges arising from ICT infrastructure; professional development; access to online resources; and limitations on electronic communication access in schools.

Most of the teachers in this study were successful in overcoming the barriers to integrating the use of the Internet within their teaching and learning activities. Part of this success was due to the teachers being provided with an infrastructure to help them succeed. The teachers were able to then provide the students both with ICT access and with meaningful activities for the students to complete using ICT skills.

One of the implications of this study is that there is a need for more professional development in ICT and Internet use for teachers. This professional development should use a skill and knowledge based program and more importantly utilise the curricula teachers are required to use with the best possible resources available. This would allow teachers to integrate their professional development with their teaching and learning programs to provide them and their students with more meaningful learning (Webb et al., 2005).

Another implication is that teachers need to be provided with ready access to excellent online resources. The CAP website is an outstanding example of ready made resources that are available and relevant to the New South Wales curriculum and this study exemplifies how some teachers are able to use these resources within their classrooms. Although these resources were designed for teachers in rural schools in New South Wales other teachers are able to access them with more teachers needing to be made aware of their availability. All teachers would benefit from more high quality online resources being developed and made available to them.

A final implication is that it is important for students in schools to be given access to email accounts because this facilitates the teaching of electronic communication skills in classrooms as well as providing the convenience of their being able to communicate using email in educational settings. Importantly this provides all students with technology access and not just those who are fortunate enough to have access to the Internet at home. Other education systems have given students school email accounts as far back as 2002 (Herring, 1999), but this is not so in New South Wales where the New South Wales Department of Education and Training has been attempting to implement email accounts for several years but where there continues to be opposition to this.

5.3 Limitations to this Study

There were a number of limitations to this study. These include:

- using a case study methodology;
- using children as subjects in this study;
- the busy curriculum;
- teacher illness and leave; and,
- the reliance on using teachers to collect the data through the use of the e-learning journals.

Being a case study can be classed as both a weakness and strength. The classes, including the teachers and the students were involved in this study in an in-depth way, which can be seen as a strength. One weakness is that the study only involved these classes and teachers and not a wider sample. Thus, this study could be expanded to involve more classes and more schools in the future.

This study primarily used children as subjects and as Greene and Hill (2005) suggest this presents the researcher with a number of challenges including the developmental age of the student, the life experiences they have had, and language development. These difficulties are acknowledged in this study and Greig and Taylor (1999) suggest that researchers be aware of these issues. Another limitation regarding using students was the need to have parents provide permission for student participation. In one class in particular only a small number of permissions were given and, combined with student absenteeism, these factors created a limited pool from which to draw interview participants.

Schools today have a very busy curriculum with many interruptions to their regular teaching activities. These interruptions can occur throughout the year and include extra curricular activities such as musical viva, sporting carnivals, theme days and school concerts. There are also regular interruptions to classroom teaching such as scripture classes, sporting activities and assemblies.

One class in this study had the additional disruption of the teacher being absent for an extended period of time during the data collection period. Even though there was a casual replacement teacher she did not teach the students computers which meant that the students did not complete the ICT unit of work that had been set for them.

One final limitation was that the research relied on the teacher giving the students 'time' to complete their e-learning journal weekly. Many teachers feel pressured for time and in this study the teachers were often no exception. The allocation of time allowed for the students to complete their e-learning journals was problematic, as reported in the teacher interviews.

5.4 Recommendations for Further Research

As a result of this research a number of areas of potential interest for further study have come to light. These relate to:

- allocation of time;
- professional development of teachers;
- socio-economic level of the community;
- implementation of new pedagogies; and,
- computer coordinators.

One recommendation for further study relates to the issue of time available for teachers to integrate ICT in their teaching. Most of the teachers in this study reported that they did not have enough time to integrate Internet usage to the degree they would have preferred. This issue needs to be explored in more depth with potential solutions to this situation being identified and investigated further.

The need for teacher professional development in ICT and Internet use for sustained success emerges clearly from this study. Although many previous studies have investigated this issue and teachers feel that they benefit from professional development there appears to be no conclusive implementation of results. It is important that more time and resources be given to professional development, and more research needs to be conducted to investigate the results of such development.

Another area for further research is that of the level of access students in low socio-economic area schools have to both computers and the Internet away from school. Thus, it is important for schools to be resourced and to plan and give students' access to the Internet in structured lessons or in other ways that promote quality ICT learning. These areas can be researched further by investigating how schools are addressing ICT usage and integration into the curriculum.

With the implementation of new technologies into the classroom it is possible that there are changes necessary in pedagogy while integrating ICT into the classroom. These new technologies include interactive whiteboards, handheld PDA's and podcasting equipment. Although the teachers in this study did not have access to any of these technologies during the data collection period, further studies could involve these new technologies and the changing pedagogy involved in their integration into classroom teaching and learning.

In this study, the school computer coordinators were crucial to the learning of the students. This was because in three of the cases the class teacher involved in the study was also the school computer coordinator while in the other two cases the computer coordinator taught the students in computer RFF. It would be interesting to know how the other

teachers in each school use ICT with their class, and this is another area that could be explored with further research.

5.5 Conclusions

Although the implementation of ICT has an important place in the school curriculum it can still be difficult to find effective integration of ICT into specific classroom teaching and learning programs. This is mainly due to various systemic and local barriers that occur within primary schools today. Teachers, however, are attempting to overcome these barriers using the infrastructure, skills and knowledge available to them.

This study has shown that classroom teachers use the Internet in various ways for teaching and learning with their students. However, use was mainly as a research tool, with the students being assigned tasks requiring them to find information on particular topics. This formal and structured use of the Internet at school differed from the students' use at home which was more focused around recreational and social activities. This study clearly demonstrates that it is extremely important to provide adequate technology infrastructure and access as well as pedagogically appropriate ICT and Internet use in order for ICT to be used appropriately and effectively with students in classrooms. The impact of these three factors is evident in the students' different school and home uses of the Internet and, along with appropriate scaffolding, is critical to the development of students' computer and Internet skills. It is hoped that classrooms in the future will provide these and thus give the necessary skills to adequately train our students for their future lives.

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Appendix A

E-learning journal

Term 2, Week 2, 2004

Questions

How many times did you use the Internet in the past week? (Please tick)

	At School		At Home	
	School Use	Personal Use	School Use	Personal Use
Saturday				
Sunday				
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				

Somewhere else? _____ Where? _____

1. If you used the Internet at school, generally what time of the day did you use it?

Before school Morning session
 During lunch Middle session
 During recess Afternoon session
 Straight after school

2. Did you use the Internet to:

Email Who? (Eg. A friend, teacher, parent) _____
 Discussion board
 Visit School site
 Go to other websites

If so, what types of website? _____

Search the Internet

If so, what search engine? _____

Chat with friends online

If so, what did you use? _____

Other Please list _____

Term 2, Week 2, 2004

Focus Questions

1. How have you used the Internet in the past week?
2. Did you use the Internet in a different way than you usually do? How?

Please record any thoughts you wish to share about using the Internet.

Appendix B

Teacher Checklist

Internet Use Survey					
3 May – 7 May					
	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Used Internet? Y/N No. minutes _____ How used?				
Mid-session	Used Internet? Y/N No. minutes _____ How used?				
After lunch	Used Internet? Y/N No. minutes _____ How used?				

Appendix C

Student Questionnaire

Code: _____

Term 2, Week 10, End of Journal

Student Questionnaire

1. Have you enjoyed using your accounts?

Yes

No

2. What types of things did you enjoy doing the most?

3. Do you use your account more at home or at school?

Home

School

4. Did you get time at school to use your accounts?

Yes

No

If yes, do you feel you get enough time at school to you the accounts?

Yes

No

5. Where would you prefer to use the accounts?

Home

School

Why? _____

6. Have you learnt how to do new things by using the accounts?

Yes

No

If yes, what different things have you learnt?

7. How would you like to use your e-learning account in the future?

Thank you for your time. 😊