RESEARCH REPORT

THE CLASSMATE PC 1:1 eLEARNING PROJECT IN AUSTRALIA

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Preface

This Report, draws together and discusses the research findings from the pilot of the Classmate PC 1:1 eLearning Project in Australia, which involved six schools across three Australian states.

In March 2008, the School of Education in the Faculty of Arts and Education at Deakin University, Melbourne, was commissioned by the Enterprise Solution Sales, Sales and Marketing Group of Intel Australia Pty. Ltd. to conduct this research. An Ethics proposal to the Human Research Ethics Committee was developed and submitted and Ethics approval for this research was granted in April 2008 (Approval Reference EC51-2008). The Research Team was then able to commence collecting data from the selected pilot schools, which at this point were at varying stages in the implementation of the project. The research continued in the six schools through to December 2008.

Intel introduced this pilot project in Australia as part of what they describe as ‘a worldwide effort to provide low-cost mobile learning device for students for use in collaborative learning environments’¹. The device was aimed first at developing countries, but its use in developed countries was now being explored as a Proof of Concept.

Its implementation in classrooms was designed to facilitate a 1:1 eLearning environment, defined by Intel as one in which ‘technology is used to create a 1:1 relationship between the student and the student’s learning environment. This involves the provision of a dedicated laptop computer for each student and teacher that can be used at home and in the classroom’¹. Although Intel state that ‘Internet connectivity is a beneficial but optional part of the 1:1 eLearning environment’¹, the Australian pilot was designed to include connectivity to the internet, technical support and training for teachers².

The 1:1 eLearning environment would, according to Intel, enable children to ‘develop the 21st Century knowledge and skills they need – including media literacy, critical thinking, abstract problem solving, collaboration, global awareness and civic literacy – to succeed in today’s global economy’¹. The ‘1:1 approach’ in the classroom was seen as one where ‘students & teachers working together, enhance the total classroom learning experience with small group interactions, content sharing, content broadcast, reduced administrative labor for teachers, and integration between inside and outside classroom learning activities’².

The different contexts, approaches, experiences and outcomes for each of the pilot schools in Australia, have been detailed in individual case studies in this report. Together with the literature review, these case studies have shaped the discussion and the recommendations that follow, resulting in a report designed to provide Intel, the Departments of Education and schools with information that will help to guide the effective implementation of 1:1 eLearning in the future.

² Enterprise Solution Sales, Sales and Marketing Group of Intel Australia Pty. Ltd., Request for Proposal, Classmate PC 1:1 eLearning Project in Australia, Jan 2008
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EXECUTIVE SUMMARY

Background and Research Approach

The Intel Classmate PC 1:1 eLearning Project centres on the provision of low-cost mobile learning devices for each student to use in a collaborative learning environment. The overall vision is ‘to create a one to one classroom environment which maximises student achievement and facilitates digital literacies for all students to prepare them for 21st century society’.

In 2008, the 1:1 eLearning Project was implemented as a pilot in six primary schools across three States in Australia. The implementation varied across each State, due to significant differences in governance structures, approaches and management of the pilot project. Individual school and classroom contexts and cultures also differed in terms of year levels, teaching and learning approaches, teacher experience in using technology in the classroom and technology resources.

The Research for this pilot project was designed to provide evidence and understanding of the impact of the 1:1 eLearning Project on teacher practice and productivity improvement and on student learning and social behaviour. Using an interpretive approach to research, case studies were developed in each pilot school. This enabled documentation and annotation of the multiple impacts observed on learners, teacher practice and the learning setting when each child within a classroom has access to a personal computer. Data was collected using a mix of methods, including the conduct of multiple individual interviews, with school leaders, teachers and relevant Department of Education personnel and focus group discussions with students, parents, ICT coordinators and specialist teachers. Classroom observations were conducted and school documentation reviewed.

The Case Studies

The pilot schools were mainly located in metropolitan areas, with one based in a rural area and another in a large regional town. The selected classes, covering years 3-6, involved students representing a cross section of socio-economic and cultural backgrounds. Prior to commencing, all schools were using ICT to some extent but the differences in ICT focus across the schools were marked, ranging from the integration of highly innovative and sophisticated technologies across all aspects of teaching practice and school life generally, through to providing students with access to more basic technologies during weekly classes in a computer laboratory. During the pilot, the sources and levels of related governance and support and the provision of required resources and infrastructure differed across the states.

The timing of the introduction of the devices in the pilot schools varied, with the first class commencing by mid Term 1 and the last commencing in Term 2. Over the year, a range of infrastructure, connectivity and hardware issues severely delayed and/or disrupted full utilisation and progress of the 1:1 eLearning Project in the schools. The time and money required to work on the various technology issues that arose over the course of the project was also problematic. However, overall, teachers remained positive, keen to continue the implementation of 1:1 eLearning in their classroom albeit restricted by some of the issues faced.

The classroom environments included some with a traditional classroom set up, where more transmissive pedagogies directed by the teacher were implemented, and others that were organised to facilitate more student centred collaborative work, with the teacher in the role of guide or facilitator. Most of the teachers commenced 1:1 eLearning with the same classroom organisation as they had had previously, but over the period of the study these learning environments were gradually modified in some way. Most needed, for example, to gain maximum capacity from the devices by providing areas for regular battery charging. Some
needed working spaces close to Ethernet connection as wireless was not available and some with wireless provided space close to a router as signal strength was low. Over time, some teachers reorganised their classrooms to incorporate both traditional and collaborative classrooms, allowing spaces for whole class discussion, individual work and group activities. In some cases students would work on the floor or at tables and in some classes furniture was shifted around to suit the particular needs on the day.

The extent to which the learning environment extended beyond the immediate classroom was limited in the majority of schools, due mainly to difficulties in achieving wireless connectivity and the short battery life of the devices. The planned home/school links in most schools were also delayed and in some cases did not eventuate.

**The Impact**

Each teacher proceeded to implement 1:1 eLearning in their classroom according to the resourcing and infrastructure they had available, their level of ICT competence and confidence, the specific goals and pedagogical approaches that were central to both their school and their classroom, and their understanding and beliefs in regard to the scope of 1:1 eLearning within the classroom. This resulted in approaches and applications that ranged from basic integration of technology in a more traditional teaching and learning approach through to student centered collaborative learning, using a range of innovative technology applications and equipment. The time spent on the 1:1 devices over the pilot ranged from one or two hours per day in one class, through to inclusion in most classroom activities in others.

Changes in the interaction between teachers and their students resulted from the introduction of the devices. Students were motivated by the use of the device itself and became more engaged in their work, they became more self reliant, in many cases requiring less assistance from the teacher. Some teachers attributed this to the way they were preparing their students for ‘virtual’ work, with more thought being put into the issues that students might encounter. Teachers had also increased the extent to which they were scaffolding the tasks, providing students with more detailed instructions and examples. Furthermore, the students were turning to their peers to resolve issues before requesting assistance from the teacher. The ‘ICT expertise’ of the students in their classes was well recognised and teachers were keen to promote opportunities for this peer support and mentoring.

The use of email as an efficient communication medium between student and teacher was highlighted at some sites. This included group emails, from teachers to their whole class, giving instructions or links to virtual environments where learning tasks were placed as well as weekly information emails, often with links to showcase individual student work. IM chat was used in some sites for communication between students and teacher and between students. Teachers noted that in these virtual spaces, the students who were typically quiet in the physical environment were more communicative and confident about joining in. Decisions and discussions around communication skills and behaviours, such as the types of language to be used in these spaces, coincided with the introduction and use of these communication options.

Teachers presented work to students in new ways. Learning activities were introduced and explained using word processing and publishing software, which they felt was more visually appealing and motivating for students. Worksheets, developed using a range of programs, were sent to the students’ devices for completion. A range of other technologies were used in some schools to engage students in their learning.

However, while appreciating the impact of using technology in the classroom, the need to maintain writing skills, particularly for younger students was considered important, as was the need to ensure they were well prepared to complete the paper based national assessment tests.
The ways in which students were working and learning changed markedly as a result of having their own devices. More individualised and flexible learning was possible. Teachers observed greater autonomy in the way their students worked, resulting in increased motivation to apply themselves to tasks and take more responsibility for their own learning. Also noted were aspects such as increased quality of work, creativity, critical thinking, independence and the willingness of students to find new ways to gain and present knowledge. The impact on students with behaviour or learning difficulties was particularly notable. In some cases the capacity to type rather than handwrite resulted in improved achievement levels and higher quality work products, along with increased confidence and enthusiasm. School attendance also significantly improved in some cases.

A change in the ways that students would dynamically shift between working independently and cooperatively was also noted at some sites, with students often communicating amongst themselves both virtually and orally, discussing their approach to the work and their learning. Often collaboration extended to virtual communication with students from another classroom or multiple people beyond the school.

Decisions on the future of 1:1 eLearning in the six pilot schools vary significantly. While most see significant benefits, any expansion into other classes is determined by budgetary constraints, different priorities and their overall philosophical approaches to the use of ICT in teaching and learning.

Factors Influencing Success

Several key factors contributed to, or alternatively hindered, successful implementation of 1:1 eLearning in the pilot classrooms. Firstly, major issues in regard to the ICT infrastructure, connectivity and hardware significantly delayed and disrupted the successful introduction of the 1:1 devices. Insufficient wireless access, incompatibility between key networks and inadequate servers to deal with the increased traffic, created additional workload and costs. Whilst the 1:1 device was considered to be sturdy, compact and light, which added to its flexibility, portability and security, its slow start-up time, limited battery life and insufficient memory capacity were drawbacks. Of most concern was the ‘breakdown’ of numerous devices, over the period of the study which typically involved lengthy repair or replacement periods.

The technical support available varied across the sites. All schools were guided and supported in their everyday practices and policies around technology use, by their State educational body and associated ICT divisions. Some schools also had close associations with external agencies, including ICT related companies. All had members on staff responsible for ICT at the school. The 1:1 classroom teachers covered a broad range of technical knowledge and experience and similarly the Principals, although all very committed to the project, had very different levels of experience and expectation in regard to technology, its use in schools and, in particular, 1:1 eLearning.

Teacher attributes significantly influenced the success and nature of the implementation of 1:1 eLearning. Resilience was evident as teachers faced various unforeseen challenges and responded in ways which enabled growth and confidence in new aspects of both student and teacher learning. Their levels of confidence influenced how they were able to integrate the devices into everyday classroom learning and the extent to which they were willing to take risks with the technologies and recover from the hurdles they experienced. Creativity in implementing 1:1 eLearning practices was more aligned to those teachers with some background experience in ICTs, although evidence of emerging creative practices from teachers with less experience began to appear over the period of the study.

Teacher preparedness was also significant. Many felt that their experiences would have been better with more time and opportunity to familiarise themselves with the device and its
applications, and more information on the challenges and strengths of using the devices in the classroom. It was not until the end of the pilot that they felt prepared and knowledgeable enough to implement 1:1 eLearning effectively. The extent to which schools had already made pedagogical and philosophical commitments to the introduction of 1:1 eLearning also influenced the ways the 1:1 classrooms were approached, how schools regarded future use of the 1:1 devices and their motivation to participate in this study.

The pedagogical approach (where the term pedagogy refers to the broader overarching approach a school or teacher is committed to in developing learning over extended periods) varied between transmissive pedagogies, and more student driven inquiry pedagogies. This resulted in very different levels of structure, application and time spent teaching explicit skills. However, although the approaches were different, it was apparent in the study that the teachers who were strongly committed to a particular pedagogical approach were most successfully able to introduce 1:1 eLearning, as they had the capacity to know and adapt their specific pedagogical stance for the inclusion of the devices.

The level of prior teacher professional knowledge, regarding the general use of ICTs and also the pedagogical practices incorporating ICTs, varied considerably across the schools. Those teachers with exemplary skills in and understanding of ICTs were able to more confidently address challenges which arose in the classroom, and explore the limitations and possibilities of the devices. While some schools were able to provide on site training and support, and in some cases there were training and development opportunities at a state level, for other sites the planned professional development and opportunities for collaboration across the pilot schools and beyond, did not eventuate.

School leadership provided the impetus for introducing the devices in the schools, supported in some cases by external initiatives from their departments of education. Although the schools were at very different levels in regard to ICT implementation, all principals were keen to extend the ICT practices within their schools. Some were very heavily involved, driving the initiative, allocating significant resources and working with the teachers to ensure they expanded on their innovative use of ICT through 1:1 eLearning. In contrast, others were observing, supporting and learning from the teachers’ progress and experiences in the pilot. The emerging leadership capacity of some of the 1:1 teachers was also demonstrated as they took on more responsibility for the professional development of others, leading the process and driving 1:1 technologies even further in the school.

Overall, the study has contributed considerable insight into the possibilities and challenges of innovating with ICTs through the provision of 1:1 eLearning. Much of what has been learnt reinforces the key factors highlighted in previous literature. The impact on teacher practice and student learning has been considerable and, although the implementation of 1:1 eLearning in the pilot schools did not extend to the levels they initially expected, their experiences and the various factors that hindered their progress have provided significant learnings and highlighted future directions for further exploration.
THE CLASSMATE PC 1:1 eLEARNING PROJECT IN AUSTRALIA

1 INTRODUCTION

1.1 Background

The Intel Classmate PC 1:1 eLearning Project (hereafter referred to as the 1:1 eLearning Project) centres on the provision of low-cost mobile learning devices (hereafter referred to as ‘devices’) for each student to use in a collaborative learning environment. The overall vision is ‘to create a one to one classroom environment which maximises student achievement and facilitates digital literacies for all students to prepare them for 21st century society’\(^1\). Although initially targeting schools in developing countries, the introduction of 1:1 eLearning in developed countries is now being explored.

The objectives of the 1:1 eLearning Project include:

- Increasing student engagement with learning
- Encouraging collaborative learning
- Encouraging teachers to integrate innovative teaching practices through technology
- Maximising individualised learning
- Enhancing time and personal management skills and organisational skills to enable the students to function effectively in the 21st Century
- Increasing access to technology anywhere, anytime
- Providing seamless connectivity.\(^2\)

1.2 The Australian Context

In 2008, a pilot of the 1:1 eLearning Project in Australia was implemented in six primary schools across three States. It was recognised that the implementation of this pilot project would vary across each State, due to significant differences in governance structures, approaches and management of the pilot project.

In two States, the pilot 1:1 eLearning Project was managed by divisions within their Departments of Education. Personnel responsible in these divisions negotiated the set up of the project and the purchase of the devices directly with Intel. In one of these states, the division was already providing support and advice to School leaders considering the implementation of one to one computing in their schools. They were also integrating plans for 1:1 eLearning in their State ICT planning strategies and structures. In the other, one of schools involved also received significant funding and support from their Regional Office who were interested in the impact of 1:1 eLearning on indigenous students. In the third State the two schools involved were part of an established network of schools that had received State Government funding to explore and trial innovative technology based approaches in teaching and learning. Although this State’s Department of Education was interested in the outcomes of this pilot, the management of the project remained with the schools.

Individual school contexts and cultures also differed, both within and across the states, and the classes in which the computers were placed varied considerably, particularly in terms of, for example, year levels, teaching and learning approaches, teacher experience in using technology in the classroom and technology resources. As part of the 1:1 eLearning Project in Australia these pilot schools were to have sufficient devices for one class, a teachers’ laptop, teacher training,
WLAN infrastructure, parental control software and in-classroom collaboration (teachers’ control) software, connectivity to the Internet and technical support. The degree to which Intel, the Departments of Education and the schools were responsible for meeting each requirement, varied significantly across the States.

1.3 The Research

The overall goal of the Research was to provide evidence and understanding of the impact of the 1:1 eLearning Project on teacher practice and productivity improvement and on student learning and social behaviour.

It was designed to gather and document information that would guide and improve future implementation of 1:1 eLearning in teaching and learning. It would also increase understanding of its potential for replication in other contexts and what is needed to do this successfully.

In particular the research sought to address the following questions:

- How did teachers change their practices as a result of the program?
- How did student behaviors and learning outcomes change?
- How did 1:1 eLearning affect teaching, learning and the classroom environment?
- To what extent were the various components of the project (e.g. hardware and software, training, technical support, connectivity) appropriate, adequate and effective in achieving the objectives of the program/bringing about change?
- What other factors influenced the extent of the changes?
- To what extent was the program implemented as intended?
- What hindered the implementation and outcomes of the program?
- To what extent did the project meet its objectives?
- To what extent is the 1:1 eLearning project transferable to other contexts and scalable?

The following report details the approach taken in this research, the findings from the research and the implications of these findings for future implementation of 1:1 eLearning in Australia.

2 THE LITERATURE REVIEW

Currently, there is an impetus to increase the number of computing devices in schools across Australia. In particular, the discussions of 1:1 eLearning pedagogies, or ubiquitous approaches in 1:1 eLearning, of which much is expected, promised and hoped for, are increasingly on the agendas of educational leaders and other stakeholders. In this study, we focus upon the impacts of 1:1 eLearning across three states of Australia and six schools. Informing some expectations arising from this pilot directed by Intel Pty Ltd, is current literature which describes previous studies in this area. Whilst much is said more broadly about the use of ICTs across education, there is limited research available regarding the effective implementation of 1:1 eLearning.

In this review of current literature, we will describe six key ideas which have been ascertained from previous research. In the first instance, we will outline many of the assumptions and expectations associated with the integration or implementation of one-to-one computing in schools. We will then highlight the ways in which computers have been used in classrooms. Also described within the literature are the ways in which teachers adopt or reject the uses of computers, and the period over which this occurs. Within the literature, there is much discussion about the types of pedagogies employed by teachers in introducing ICTs into, and alongside the curriculum, and the ways in which classroom dynamics shift throughout this process. We will
refer to the limited research on student learning within the literature, before concluding with a brief précis of literature which alludes to the significance of adequate resourcing to support implementation of one-to-one computing.

2.1 Assumptions and Expectations of 1:1 eLearning

There are many assumptions and expectations regarding the uses of ICTs in classrooms. These include the idea that all children and all classrooms should have access to computers in order to participate fully in the future. Further, it is assumed that once a computing device appears within a teaching space that the technology and pedagogical practices of teachers will simply emerge. Cuthell (2006) describes the cultural and social milieu which suggests that there is a perceived imperative of student entitlement to an innovative and challenging education. As part of this ‘digital age’ (Rose & Meyer, 2002), the presence of a computing device is symbolic of the ways in which these innovations are apparent within the classroom of learners, to parents and other stakeholders (Penuel, 2006; Stager, 2005). There is frequent media coverage and educational policy ("Canberra Times: Feds offer an extra $800m for school computers," which highlight the value of ICTs in curriculum through the advertisement of how many computers or devices are available in a school, per student head ("On a growth mission - COVER STORY.") As part of his ‘Education Revolution’, the Australian Prime Minister has committed adequate resourcing to enable every child access to a computing device (Elks, 2008) In this study, there is a clear tension between the value of having computers available, and how they contribute to learning which ensures that ‘no child gets left behind’ (Weingarten, 2009).

Having highlighted the increasing advocacy for placement of computers within classrooms, however, whilst ICT is integrated into the lives of most adults (Sheridan & Pramling Samuelsson, 2004), its presence in schools is still contentious. Forty years after the 1:1 concept was first mooted, the notion of a laptop for every student appears to be more controversial than ever (Stager, 2005). The debate is centred on what is referred to as the ‘digital divide’. The digital divide, simply articulated, identifies the access to ICTs as social and cultural capital which contributes to a person’s ability to fully participate within the knowledge economy (Centre for Educational Research and Innovation & National Center on Adult Literacy, 2000; Compaine, 2001; Servon, 2002). Prensky (2001) also highlights other aspects of the divide, in generational domains, describing digital natives and immigrants, as those who come naturally to digital practices and those who must learn them. There are other educational philosophies (Lankshear & Knoble, 2000) which are tentative about the over-representation of technologies within classrooms at the expense of more tactile learning expressions and pedagogies which engage body, mind and spirit (Mitchell, 2007).

The age at which ICT and 1:1 eLearning are introduced in school is also contentious. According to Dwyer (2007), educators doubt ‘the appropriateness of computer-based learning for young students’ as ‘the majority of teachers….were not convinced of the value of ICT-based learning for early childhood classes’ (p. 94). He described the lack of opportunities which were available for primary aged children in ongoing ICTs, and the lack of resources which are funded for primary schools more generally. These concerns are echoed in other studies (Sheridan & Pramling Samuelsson, 2004). However, general support for a progressive increase in technology use in classrooms is given by Stager (2005), who describes the increasing ICTs skill level of children down the age group of children as each year goes by. Similar to Prensky (2001), he argues that curriculum policy and educational practice must address these increasing ICTs skills and knowledge which arise predominantly from students’ lifeworlds (Cope & Kalantzis, 1999).

Much tension regarding the use of ICTs in schools arises from a further assumption held by departments of education, politicians, parents and the media that ‘once hardware and software are readily available in schools, ICT integration will automatically follow’ (Lim & Khine, 2006,
p.297). In this, and other studies (Cuthell, 2006; Dwyer, 2007; Ortega & Bravo, 2001) what is largely overlooked, during implementation stages is the complex processes required to ensure efficient ICTs usage within school and external infrastructures, as well as ongoing support. Tanenbaum (2002) suggests that this often occurs as a result of the expectations a person transfers between their experiences of personal computing and networked computers and the nuances which exist between these modes. The other demands overlooked in introducing ICTs into teaching spaces are the requirements of teachers in both personal computing competencies, as well as their pedagogical capacities in incorporating ICTs (Wright, 2004). Teachers are not sole agents working in isolation; they work in a collegiate and institutional environment – a school situated (mostly) within the parameters of a government education department. Thus, 1:1 implementation is both an individual and an institutional concern. Cuthell (2006, p. 99) likens schools to supertankers – ‘A change of direction requires a considerable amount of forward planning before it takes effect’.

2.2 Teacher Adoption of ICTs

Teachers are one of the key determinants of an ICT initiative’s success or its lack, and a ‘supportive teaching and learning environment is important, but the teacher’s role and style remain integral’ (Neal, 2007, p. 8). 1:1 eLearning does not easily or even automatically cause a shift in classroom dynamics (Garthwait & Weller, 2005). Teachers are the gatekeepers of the classroom and, as such, will eventually determine the extent and effectiveness of ICT integration in their classrooms (Roblyer, referenced in Lim & Khine, 2006).

Teacher’s attitudes, knowledge and experience are integral (Neal, 2007; Alexandersson et al, 2004). Teachers, like students, bring their own knowledge, their prior learning and their experience to the classroom. Teachers are often all too aware of their lack of preparedness for ICT integration (Hill & Mulhearn, 2007). There are numerous studies which suggest that the teacher’s own disposition towards ICTs will strongly effect the success or failure of ICT integration within the classroom (Garthwait & Weller, 2005; Russell, Bebell, & Higgins, 2004). The literature describes teacher knowledge, attitudes and skills in using ICTs within a classroom, as well as highlighting barriers to teacher success in this area.

Much of the literature points to the anxiety experienced by teachers (Wright, 2004) in introducing ICTs, and especially 1:1 eLearning to the classroom. There is anecdotal evidence that the same levels of anxiety around ICT as expressed by teachers are not present for younger school students (Stager, 2005) and further that older teachers will experience higher anxiety in using ICTs than will their younger counterparts (Riley) Much of the anxiety is caused by the fear of what might happen which might be out of teacher control and ability to resolve. Other anxieties arise from the shift in the locus of control of learning when students become more reliant on a device rather than the traditional expectation of the teacher (Crockett, 2002). Neal (2007) describes anxieties experienced by teachers that their current practices will gradually become redundant as a result of computers in the classroom. This is strongly linked to the belief that ICTs are most effectively used when aligned to a particular pedagogy, where learning becomes more self-directed, taking fuller advantage of the research and creative affordances of the technology (Hill & Mulhearn, 2007. This in turn, repositions the role and expertise of the teacher, and assumes a particular skill and knowledge set also.

Teachers believe that their teaching practices will be strongly changed by the integration of computers within the everyday learning experiences within a classroom. What is apparent from the literature is that change gradually occurs over a prolonged period of time. In one longitudinal study, it was concluded that one-to-one computing eventually changed the roles of teachers’ from the status quo when pcs are first introduced to ‘teachers moving along a continuum of instructional evolution over time, from entry, adoption, through adaptation, appropriation to invention.’ (Sandholtz, 2002). Indeed, as Garthwait and Weller (2005, p. 375) report, “change
takes time and deep change may take longer, but major shifts are unlikely without the concomitant efforts of teachers to understand and to share belief in transformational goals’. A barrier often identified within the literature is the haste with which stakeholders anticipate that these changes may be evident within the day to day practices of teachers within classrooms, and more broadly across schools. For change to occur, professional development that concentrates on new pedagogies and teachers’ general views of knowledge and learning is critical, rather than professional development that concentrates on the functions and benefits of ICT (Sheridan & Pramling Samuelsson, 2004).

Throughout the literature, there is much discussion about barriers to teacher professional learning with regards to ICTs’ practices within classrooms. First-order barriers to learning are those that are extrinsic to teachers (Ertmer referenced in Lim & Khine, 2006) and include obstacles such as lack of access, insufficient time to plan instruction, inferior equipment – factors all noted in Australian schools (Dwyer, 2007). Network reliability is another extrinsic barrier frequently cited in the literature as an issue (Penuel, 2006). Second-order barriers to learning are those that are intrinsic to teachers. They are usually rooted in teachers’ underlying beliefs about teaching and learning – for example, a lack of belief that ICT enhances the learning process (Greenberg et al., referenced in Lim & Khine, 2006) or even an unwillingness to change (Ertmer et al., referenced in Lim & Khine, 2006). These can create obstacles to the fundamental change of ICT integration into learning (Ertmer et al., referenced in Lim & Khine, 2006).

2.3 How Computers are used in the Classroom

Neal (2007) observes that a high level of quality ICT would entail the computer as a multifunctional tool that is integrated with other activities. However, this integration of ICT within the classroom is far from assured. Coulter (2001) reports that the literature on information and communications technologies (ICT) used in classrooms predominantly focuses on Internet and word processing functions only, rather than making a wider investigation into the integration of the multifunctional possibilities afforded by the technology. He also notes that there is an absence in the literature of specific discussion of other forms of ICT such as data projectors, digital cameras, and graphics and publishing programs, their integration into classroom practice, and the ways they can be incorporated into learning.

In general, the introduction of ICTs into any classroom appears to focus on the development of a student’s ability to use a hierarchy of computer applications. The starting point for ICT usage in a classroom is word processing packages, and progressively moves to a presentation tool such as PowerPoint (Penuel, 2006). More recently, classrooms are employing the use of photo publishing applications which allow students to integrate images, movement and audio-files. According to Jedeskog and Nissen (2004) in the cases where 1:1 eLearning has been introduced, much classroom time is spent on the process of Internet access. They consider this focus on endless Internet searching as an individualised task which in turn can lead to the neglect of content. Much of this work is increasingly responding to the ways in which teachers perceive and apply project-based learning in order to more fully utilise whatever technologies are available for learners in the classroom (Penuel, 2006).

2.4 Teacher Pedagogies using ICTs

Neal (2007) asserts that advances in technology will not make current teaching methods redundant and that the critical factor in supporting effective learning with ICT is to focus on how it is integrated into the classroom. There is limited discussion about the different approaches which are used to integrate computers into the everyday practices of teachers and students within a classroom. However, the seamless integration of computing devices within any space is commonly referred to as ubiquitous computing (Hwang, Wu, & Chen, 2007; Ortega & Bravo,
2001; Tomei, 2008; van't Hooft & Swan, 2006). It is the ideal of ubiquitous computing which underpins many of the notions of what is effective ICTs pedagogy.

How technology is integrated into the classroom and how pedagogical innovation is promoted are both dependent on the training of teachers. As professional development, training should emphasise the application of tools rather than only the use of them – that is, teach teachers how to teach (Riley, nd). When ICT professional development is aligned with the content to be taught, teachers are more likely to use the technology, and when the expected uses of the technology aligns with the curriculum, 1:1 eLearning is used more often in classrooms (Penuel, 2006). However, the literature describes a significant lack of professional learning in this area. According to Webb and Cox (in Dwyer, 2007), there is a consistent lack of professional development towards an understanding of the pedagogy of using ICT within a general educational context of the ‘current curriculum which works against [the] valuing of ICT’ (p. 101). Similarly this was evident in Cuthell (2006) in an international study of schools: ‘the number of schools that have changed their praxis is small, despite the UK’s considerable initiatives’ (p. 100). The change in professional development required will involve teachers collaborating on curriculum development, expanding classroom boundaries, and connecting students to real-world events (Tubin, 2006).

Larger classroom goals are often focused on the role of the teacher as facilitator in the classroom. Teachers need to be prepared for the integration of ICT into their pedagogy (Russell et al., 2004). Part of this preparation is largely underpinned by their professional learning and understandings more broadly across education. Cuthell (2006) claimed that it is the teachers whose pedagogies are grounded in constructivism, multiple intelligences (MI) theory, or learning styles who are likely to adapt to a learning environment where ‘knowledge is inseparable from practice’ (p. 101). Furthermore, it is claimed that the goals of 1:1 eLearning have the potential to be achieved by teachers who can accommodate and adapt to new teaching and learning practice, who understand that ‘diversification has to be dealt with as a factor contributing to (rather than impeding) changing practice in the classroom’ (Fasso, 2007-08, p. 26).

According to Neal (2007), a larger goal of the constructivist, ICT-integrated classroom is to help pupils to go from passively receiving information to actively searching for it, giving students greater responsibility for their own work. ‘Without purposeful planning and philosophical alignment, the “unanticipated” effects of [an] educational shift from teacher-centred to student-centred learning cannot be taken as inevitable’ ( Schofield, 1995, as cited in Garthwait & Weller, 2005, p. 364). Dwyer (2007) suggests that as teachers begin to use ICTs more frequently in their classrooms rather than introduce new pedagogies, teachers will often use the technology on behalf of their students – creating worksheets to be printed off and photocopied for students. In particular, he describes the ICT learning at primary year levels as limited both because of teachers’ ‘lack and understanding…of the learning capabilities and needs of young students’, how to use ICT to support learning, and time constraints that lead to ‘explicit, linear teacher centred instruction…for ICT skills learning’ (p. 98).

There is some evidence that 1:1 eLearning leads to an increased use of inquiry interdisciplinary and integrated approaches, and of collaborative structures for learning and increased use of differentiated or individualized learning tasks (Fairman, 2004, as cited in Garthwait & Weller, 2005). However, other studies (Jedestkog & Nissen, 2004) caution that a curriculum-related shift from teacher-led instruction to more participative and responsible student learners can mean a dissolution of the boundaries of control and responsibility, one in which teachers are often not confident that students have the capacity for self-responsibility with their own learning, a learning environment in which the focus of learning has shifted away from content towards process (Sheridan & Pramling Samuelsson, 2004). Penuel (2006) suggests that whilst such inquiry and autonomous learning approaches are often advocated, they have not been widely implemented.
2.5 Student Learning

Although ICT has become a part of children’s everyday lives, students themselves are not included in many studies, and thus direct investigations of students’ opinions are largely missing from the literature on ICT use in schools (Fletcher, quoted in Neal, 2005). In the literature which is available, however, there are claims that 1:1 eLearning increases computer skills, student motivation, and student capacities to work both independently and collaboratively (Russell et al., 2004. Further, it is claimed that in order to increase student effectiveness in learning, teachers shift from directed instructors to facilitators and agents of self-directing and inquiry based learners. Neal (2007) foresees the requirement for teachers to affect a more profound shift from teaching content to facilitating the processes of learning: ‘Effective teachers who incorporate ICT will need to facilitate a learning environment that also supports co-constructive learning opportunities for their students (p. 7).

The move towards a student-centred environment can mean that classroom communication between teacher and students is changed in a 1:1 environment from an oral focus to a concentration on written work supported by ITC. This shift places greater demands on the student’s ability to read and write, and information organisation and analysis can become secondary to the process of searching for information (Jedeskog & Nissen, 2004, p. 42). Interactions between students also differ in a 1:1 environment, marked by increased engagement from the students, as there is less whole class discussion and teachers are more able to individualise instruction (Russell et al, 2004).

Individualised instruction places great demands on teachers’ time, and when teachers no longer have the same opportunity to follow and control pupil work, self-guided tasks might focus at too low a cognitive level (Carlgren quoted in Jedeskog & Nissen, 2004). When they are asked, many school students themselves feel that the ICT curriculum underestimates their capability (Cuthell, 2006). Indeed, in an Australian study into middle years students in Victorian government schools evidenced many students describing moments where the sole intent was information reproduction. The exception to this was observed when a more ICT-focused pedagogy was used; Neal (2005) found that ‘higher cognitive thinking was evident in tasks when ICT was purposefully integrated with subject content’ (p. 19).

In previous studies, there are claims that students are able to apply themselves increasingly to both independent and collaborative tasks as a result of 1:1 eLearning approaches. Russell et al. (2004) describe their observations of students engaged in prolonged independent studies, enabled as the students were able to be self-directing as opposed to paced by the skill and frequency of both the teacher and their peers. Similarly, a Swedish study emphasises the direct collaborative nature of classroom work (Sheridan & Pramling Samuelsson, 2004), where new topics are explored, questions asked and reflections made. In this model, teachers interact with and guide the children, helping them to experience the computer as a communication and information tool with vast possibilities. Furthermore, both of these studies claimed that as a direct result of the computers being present that technology was used more frequently, in more depth (a much larger presence in the 1:1 class was found particularly in science, social studies and maths with increased use of PowerPoint, word processing and the Internet) and for an increased variety of academic purposes in the 1:1 classroom.

ICT’s potential is widely discussed in the literature, but so too are the limiting factors that include those intrinsic to students. They can be in charge of what they are manipulating – ‘with speed and control rather than thoughtfulness and understanding, but not necessarily in control of what they are learning’ (Neal, 2007, p. 8). In the 1:1 classroom Jedeskog and Nissen (2004) found that teacher–pupil interaction (as opposed to teacher-led instruction) becomes preoccupied more with search alternatives than with content. Neal (2005) also reported that individualised learning can become isolated learning (and much activity can mean levels of ‘busyness’ that need...
not equate to active or deep learning. However, Neal (2007) also reports that in a supportive (constructivist) environment, the use of ICT promotes students’ autonomy and gives them opportunities to work collaboratively with others. It promotes opportunities for deeper cognitive processes and can engage students in intellectual activities with some control over learning. It is clear that there is much to be learned from student engagement with 1:1 eLearning.

2.6 Resources

Within the literature, much of the focus is on the barriers that exist to a supportive, ICT-integrated learning environment: barriers which are technical, attitudinal and pedagogical (Dwyer, 2007; Garthwait & Weller, 2005; Lim & Khine, 2006; Palloff & Pratt, 2001). In most papers, there is a common argument for more hardware, more software and more resources in general. However, the most common mitigating factor is that of the essential resource of time. Dwyer (2007) claims this as a familiar cry of public education systems.

ICT-mediated lessons can take longer than teaching by traditional methods as control becomes more shared within the learning environment (Jedeskog & Nissen, 2004). This is not uncommon in ICT-mediated lessons for a variety of reasons: hardware and software problems, the different paces that students work at, or even the individualised nature of work being undertaken (Jedeskog & Nissen, 2004). Lim and Khine (2006) suggest that this is more easily addressed within current primary levels where the classroom teacher is less constrained by fixed time periods. However, time is a factor both within and beyond the classroom. The teacher’s own time is also at stake; the ‘best predictors of the use of classroom technology also included openness to unspecified change and a willingness to invest time and energy beyond contractual duties’ (Vanatta & Fordham, 2004, as cited in Garthwait & Weller, 2005).

In a 1:1 environment with ICT integrated into the curriculum practice in the classroom there is the clear expectation of individualised teaching, in which tasks are adjusted to pupil ability. However, in practice there seems to be little evidence of this, as resources frequently are strained and unevenly distributed; the learning potential constrained by a comparative lack of provision to younger years classes; and the need for new understanding and pedagogies (Dwyer, 2007; Lim & Khine, 2006). It is clear that, while ICT offers new ways of learning and has the potential to change approaches to that learning (Neal, 2007), the environments in which students are learning must support them in the use of ICT (Dwyer, 2007). Significantly, Cuthell (2006) in his investigation of ICT in schools, found that the schools with better resources achieve better grades in English, maths and science.

The promise, expectation and potential of 1:1 eLearning – of computers as integrated tools, constructivist classrooms of independent and engaged students – are both possible and desirable. But only with innovative pedagogies and a commitment to teacher professional development.

3 THE METHODOLOGY

3.1 Methodology Approach

The research design for this project was based on an interpretive approach, which enabled the documentation and annotation of the multiple impacts observed on learners, teacher practice and the learning setting when each child within a classroom has access to a ‘personalised’ personal computer. This particular methodology involves two elements:

- Postanalytic ethnmethodological, which identifies three main points: what is being accomplished, under what premises or conditions, and through the use of what resources and understandings? (Gubrium & Holstein, 2000). It therefore focused on how the participants did
things, which directly related to the teachers and curriculum implementers in the schools, as well as the Intel implementation team.

- **Critical ethnographic**, which focuses on how participants see things, particularly students and teachers, but also other stakeholders ‘outside’ the classroom. (Gubrium & Holstein, 2000). Ethnography as described by Burns (1990, p. 223), “essentially involves descriptive data collection as the basis for interpretation; it represents a dynamic picture of the way of life of some interacting groups”. There were a number of interacting groups to be considered, including governmental departments, school leaders, teachers, students and parents, as well as a corporate partner in Intel. Their interaction was considered in light of the 1:1 eLearning Project as it rolled out across the nominated schools. This interaction was ‘value-laden in its orientation’ (Creswell 2002), promoted by education documents, external and internal to schools, and creating impetus for greater interaction with ICTs based on the assumption that the use of multiple technologies will improve student learning and teacher pedagogies.

The development of a **Case Study** of each school involved in the Pilot Project was considered the most appropriate method for this interpretive approach to the research. Case studies rely on interviewing, observation, and document analysis (Denzin & Lincoln, 2000) drawing attention to what specifically can be learned from the single case or multiple cases under investigation. In this research, the many parts (schools, teachers, students, leaders, department personnel and the Intel implementation team) provided significant data on the implementation of 1:1 eLearning within the selected classrooms.

The Case Studies approach provided intrinsic, extrinsic and instrumental interest for this study. They were intrinsic as each school had a vested interest in how they perceived their performance within this trial and would endeavor to capitalise on this opportunity to have access to the resources. They were extrinsic as there were multiple stakeholders who would be interested in the outcomes of this project (Departments of Education/Governments, School Communities, Intel, wider ICTs communities) and they were instrumental as all stakeholders had the opportunity to engage with the case studies on micro levels, and could draw rich comparisons between multiple cases. In turn, this would provide the platform to better understanding and "perhaps better theorizing, about a still larger collection of cases" (Stake, 2000, p. 437).

**A Literature Review** was conducted over the project period in order to determine what others have learned about similar research problems and to gather information relevant to the research problem at hand Wiersma (1995, p. 55). Literature from a variety of sources was drawn from the disciplines of psychology, philosophy and the futures’ field. It included recommended literature (referred to in the Intel Evaluation Toolkit 1.1), as well as using a variety of searches, such as database and internet sources, to access a range of periodicals, journals and other published documents. It involved analysing and synthesising the information and using this as a basis for thinking about and reporting on the schools being studied.

### 3.2 Methods used for the Case Studies

**Sampling**

This research employed Theory or Concept sampling, described, as a purposeful sampling strategy, where “individuals or sites are sampled because they can help the researcher to generate or discover a theory or specific concepts within the theory” Cresswell (2002, p. 196). The study does not "quest for conventional generalizability, but rather an understanding of the conditions under which a particular finding appears and operates: how, where, when, and why it carries on as it does" (Huberman & Miles, 1998, p. 204).

The 1:1 eLearning Classmate PC Pilot in Australia includes six schools and each has been included in this research. Although the specific device used for the Pilot was in some schools
provided to more than one class, this research focused on the study of only one 1:1 eLearning classroom per school. It is also noted that one of these case study schools did not adopt an authentic 1:1 eLearning approach, as defined when each student in the class has ownership of, or is responsible for a specific device. As a result, whilst there were some interesting learnings for the school, and there are some learnings that relate to a student’s regular access to computers and the implications of this, the research team was unable to use this data to directly discuss the effectiveness of 1:1 eLearning.

Document Analysis

A range of documents was drawn on to establish a context and baseline for later comparisons and to view ongoing change. These came from each State’s Departments of Education, the schools and the individual classrooms and included policy, curriculum, planning and correspondence documentation, evaluation processes and outcomes, and individual samples of student work. In addition, Intel’s implementation plans and processes and information pertaining to the device and the software being used in the 1:1 classroom were viewed to further contextualise what occurred within the different case study schools. Analysis of this documentation provided an understanding of how the project unfolded, and how learning and engagement was represented.

Data Gathering from the Key Stakeholders

Data was collected in a range of ways, from the key stakeholders over four key phases:

- **Pre-Implementation Phase**: the school and classroom context prior to the commencement of the program
- **Intervention Phase**: involving equipping the classrooms with the technology hardware and software, training the teachers and IT support staff and providing ad-hoc second-level technical support and resources for effective implementation.
- **Classroom Implementation Phase**: involving the initial changes that are taking place in the classroom as a result of the intervention, in particular the ways in which the teachers integrate ICT into their teaching practice and the initial impact this has on the students.
- **Ongoing Impact Phase**: involving the changes occurring to teacher practice and student learning and behaviour as the 1:1 eLearning environment becomes more established.

School visits occurred over intervention, implementation and impact phases. Data gathering strategies included the conduct of multiple individual interviews with school leaders (phone and face to face), the teachers in the selected 1:1 classrooms and relevant Department of Education personnel. Focus groups were arranged with students, parents and other teachers, including ICT coordinators and specialist teachers. The questioning for both the interviews and focus groups was typically semi-structured, as opposed to strictly scripted, to allow for clarification within the interaction. This also allowed for an amount of spontaneous discussion arising from points raised by the respondents or the interviewer. Classroom observations were also conducted over the three phases and in one school, students completed an online survey. In addition, ongoing discussions with relevant Intel personnel were conducted over the research period to gain clarification and information on progress of the pilot.

Analysis of Information

Analytic bracketing was used to analyse and draw conclusions from the data. This method allowed the waves of data captured to be organized in ways which reflected two dialectics at play—what is said (discursive practice) by documentation, curriculum leaders and teachers, as well as Intel implementation, and what is done (discourse-in-practice) by teachers and schools. Underlying this research analysis was a further bracket of contextual and perceptual understandings and narratives, based on the reports of those who were involved in the implementation processes and the enactment of projects within the sites. A number of factors
limited the data collection over the period of the research. These included the later than anticipated timing of the research, due to the short lead time available to complete contractual and ethics requirements, the variations in pilot commencement dates between schools and the ongoing infrastructure and technical issues that significantly delayed commencement and full implementation in some schools.

4 THE CASE STUDIES

4.1 School A

4.1.1 School Context and Approach

School A, situated in a metropolitan area, has a student population, of over 500, comprised of 83% from non English speaking backgrounds, most of them second generation Australian. According to the principal, the parents are very traditional, with high expectations for their children, and are typically very trusting of the teachers.

Teaching and Learning Approach

The school curriculum revolves around their Department of Education key learning areas across the stages of schooling, which are grouped to generate a largely teacher-directed, interdisciplinary, project-based pedagogy. This is also the focus of the team teaching that occurs in the computer laboratory sessions, and the units of work developed for teachers by the Computer Laboratory Teacher. The involvement of all teachers in the Intel Teach Essentials Course, has contributed significantly to the implementation of a technology focused, project based learning approach across the school.

The Focus on Technology

The integration of technology in the classroom has been emphasised in the school’s approach to teaching and learning over recent years and this focus had increased in the previous year with the appointment of the new Principal and Assistant Principal. The school is well equipped with technology. The computer laboratory has a permanent Computer Laboratory Teacher, so is used in a team teaching mode. The library is also well equipped with a set of computers. Year 6 classes now have an adjoining room with a bank of computers for student use. Each of the other classrooms is equipped with 3 to 4 computers. The use of interactive whiteboards in teaching and learning has become a strong focus in the early years’ classes.

In addition to the Computer Laboratory Teacher, the support and involvement of an ICT Specialist Teacher (who is also part time in the Library) is considered key in supporting the increasing focus on technology in the classroom. He has been involved in the set up of the networks and infrastructure and in supporting and training teachers, particularly in the Intel Teach Essentials Course, the Intel Thinking with Technology Course and the use of SKOOOL, which has become the basis of Stage 3 technology units. This significant training and ongoing support has resulted in notably high levels of technology skills and understanding across the staff.

The three year plan, 2008–2010, anticipated a significant increase in hardware provision across the school and the transfer of skills from the computer laboratory back to the classroom. In 2009, greater emphasis on classroom based modelling and team teaching is planned as the main approach to further developing teacher skills and confidence in the use of technology in the classroom.
Technology was also increasingly being used to link home and school. In 2007, Year 6 students piloted technology-based homework involving projects, individual learning contracts and weekly electronically posted homework tasks.

**Rationale for Involvement**

The arrival of the new Principal and Assistant Principal in 2007 stimulated a culture of change in the school. In particular, technology became a strong focus in teaching and learning and, by 2008, the school had already had an involvement with Intel, having been the venue for the official State Ministerial SKOOOL Content Launch.

Computers for each student, plus the promise of a new interactive whiteboard, wireless and broadband connectivity and funds to cover costs was also a strong attraction. The school was confident that the ICT Specialist would be able to work closely with the 1:1 classroom teacher over the year and play a major part in the establishment and ongoing support for the 1:1 eLearning Project.

Their key consideration was the improvement of student outcomes. According to the Principal ‘We could see that this would benefit the staff enormously and provide learning tools to help our kids - it would be amazing for our kids.’ They also saw it as an opportunity to assess the extent to which 1:1 eLearning would increase student engagement with learning and bridge the digital and academic divide. It would also identify the school’s level of readiness, in terms of teacher capacity to integrate innovative teaching approaches and new models of personalised learning, as well as the adequacy of their connectivity, infrastructure and resources.

**Nature of the Involvement**

The 1:1 eLearning Project was implemented in a Year 4 classroom with 29 students. The teacher involved, who was new to the school, had a strong interest in the use of technology in the classroom. The other Year 4 classroom teacher currently includes technology extensively in her teaching program, focusing on the use of three new laptop computers and other existing technology equipment for video production and multimedia work. This was seen as an appropriate alternative to the 1:1 eLearning classroom, preventing any disappointment that may have occurred when only one classroom was chosen for the Project.

The number of devices included those that were on loan from the Department of Education, plus seven that were purchased by the school. The principal described the school as ‘very enthusiastic’ about having the project and making it work. A great deal of effort and long hours were put into the establishment phase.

**Expectations for the Project**

The school saw the 1:1 eLearning Project as a way to expand the learning environment of the students. They envisaged students eventually using them any time and in a range of environments – in the classroom, anywhere in the school grounds or on excursions. It was also seen as a way to generate online collaboration between the teacher and students and between home and school.

**4.1.2 Introduction of the 1:1 Devices**

**The Establishment Phase**

The students commenced using the devices at the beginning of Term 2. The first term had been ‘frustrating’, with the principal ‘trying to manage class and teacher expectations’ and the expectations of the parents. This was due primarily to wireless connectivity, infrastructure and resource issues and the associated unexpected costs that were being incurred by the school as a result. The potential impact of the increased demand on the school’s existing IT networks and infrastructure, including the servers that had been installed in 2000, was a concern and rewiring of the school was needed. The filtering required when students were linking in from home also
needed consideration. The teacher laptop was not provided on time and the school also paid for a screen and data projector. At this stage of the project, the school was also unclear about who was going to pay for the necessary ongoing technological support.

The teacher release time required was significant and the professional training promised for the coordinator, class teacher and other Year 4 teachers did not eventuate. However, Intel’s assistance with hubs for recharging was considered vital in the early implementation phase. Intel also provided some training for the teacher in the use of software that enabled collaboration (such as file transfer between student and teacher), screen redirection (student to teacher, student to class, and teacher to class), the use of ‘black screen’ and ‘silence’ when students were required to stop working on the computer, and the use of group chats via the computer.

In this early phase, the principal and ICT coordinator strongly believed that the lead time for such a 1:1 project needed to be much longer and, in particular, the costs needed to be clearly identified to allow plenty of lead time to include it in the budget.

The devices were initially being used for around two hours a day. The focus was on basic ICT skills, maths topics and some webquests.

**Management Strategies and Rules in the 1:1 Classroom**

To accommodate the introduction of the devices, the teacher changed the set up of her room. Instead of group formations around tables, the tables were now in rows facing the white screen on which she projected her laptop screen. Students were facing the side window rather than the blackboard at the front of the room to keep the screens out of the direct light. The interactive whiteboard was not yet available.

Rules were put in place which included ‘don’t walk with the laptop’, ‘stay in your seat’, ‘don’t touch anyone else’s computer’ and ‘ask if you have any questions’. The devices were charged via power boards set up at the back of the room. The devices were locked away in a strongroom at night as there had recently been some break-ins at the school.

**The Initial Impact on Students**

The teacher altered her Stage Level unit plans to include an extra column for ‘pc inclusion’. Overall she considered that the class was ‘still doing the same work, just a little differently’. Although they were excited and keen to use their computers, she noted that their cooperative or interactive work had reduced and, although they were more patient they were also more passive: ‘there is not as much productive rowdiness’.

The lack of floor space that resulted from the rearrangement of the room was considered to be a significant disadvantage. As a consequence, Arts and Science had not been attempted since the room rearrangement and the teacher was still considering how she might arrange group work in the future. Differences noted between the new device and the computers the students had been using included the smaller keyboard and screen on the devices and the lack of a mouse pad. Ergonomics was raised as a potential concern resulting in the hunched shoulders of students and the lack of light due to the need to draw the blinds to clearly see the screens. The slow start-up rate of the devices was also noted.

When asked by the Principal about the devices, the students responded with enthusiasm. They liked having the computers in the rooms as they were ‘good’, ‘you learn’, ‘you learn more about computers’, and ‘you can look up your own stuff’. They noted that it was different to using the computers in the laboratory because they each had their own, ‘could change our screensaver’ and had it set up for their own needs. They did not believe that they would ‘use their brains less’. The technical problems were the only things that annoyed them. For example: ‘it keeps stuffing up’ and ‘sometimes we can barely see’ (referring to difficulties with some particular devices). In the early stages, the students invited friends from other classes to see the devices and they were
looking forward to taking their devices home as it meant that they could ‘finish off work we haven’t finished here’ and it allowed them to ‘learn all the time’.

**Initial Parent Support and Liaison**

Parents were initially informed of the project by newsletter, the school website, letters and the consent form. A parent information evening was held early in Term 2. The parents were very supportive. Their main and immediate issue was that of equity – and how would it be for the other classes who had not had a 1:1 opportunity and what would happen in the future? Concerns were also raised about handwriting and reading. The plan was to allow students to take the laptops home in Term 3. It was stressed to parents that when the laptop went home the teacher would set homework on it as it was not to be used solely for recreational use at home.

4.1.3 Progress

**Hardware and Connectivity**

By Term 3, some of the earlier issues causing concern for the school, particularly budgeting for infrastructure costs and teacher release, and the provision of wireless had been addressed through additional Department of Education funding. The school appreciated the ‘secondary benefits’ gained through these connectivity and infrastructure advances and recognised that this was ‘setting them up well’ for future directions in teaching.

However, they expressed continuing frustration at the length of time taken for the project to be ‘up and running’. ‘Our expectation was that by week 6, Term 1, having collected our baseline data, we’d then be on board with data provided over the following six months’. They now felt that useful data could only be collected ‘if given another year’.

Although wireless provision had been installed in July, making the school one of only two in the state to have this connectivity, cabling requirements and router incompatibility delayed connectivity further. The department supplied server allowed connection to the Internet but not to the school’s network, preventing access to school software, student network folders and also the Department of Education site with its inbuilt software and cyber-protection. The Intel temporary ports continued to be used.

The interactive whiteboard was installed in the classroom by this stage, as part of a State initiative. However, its software differed to that on the devices, so it proved difficult in demonstrating ICT skills and strategies to the students and was therefore more often used as a screen.

Despite the networking issues, the devices themselves were considered sturdy and reliable. Although many had to be ‘reconfigured several times’, only ‘one or two’ needed to be sent off for repair due to a problem with the screens. The time taken for the Devices to start up (5–6 minutes) was considered a problem and not all machines had exactly the same icons, or the same toolbars. By the end of the year, the synchronisation between the computers, the school network, the whiteboard and the teacher’s laptop was considered problematic, along with the slowness of the devices. The teacher expressed her concern about how much time was wasted on technical problems.

According to the principal, despite the discrepancy between ‘how the project was sold’ and the very real problems with connectivity, which have limited the effective use of the devices, the school has benefited from the investment, input and support of the Department of Education. Tens of thousands of dollars had been spent on the school in the effort to get 1:1 happening and to test the procedures and efficacy of the trial.
4.1.4 Impact on Teaching and Learning

Using Technology in the Classroom

By Term 3 the principal commented that, overall, things were beginning to happen in regard to infrastructure and support. However, although the devices were being used ‘as a tool to assist the curriculum’, she felt they were not yet the main focus in the implementation of the curriculum. ‘Initially we planned that everything would revolve around the devices. Now we are implementing the normal curriculum and, within this, the devices are used as a tool to assist.’

At this stage, both the teacher and the ICT Coordinator felt that 1:1 eLearning would provide the opportunity to develop ‘more efficient strategies for teaching…and more efficient strategies for learning.’ Changes in teaching practice would involve a migration from ‘pen to laptop and chalkboard to interactive whiteboard’ as well as ‘turning lessons into multimedia lessons where ‘the learning becomes much more effective’. They also saw its potential to enable students to take responsibility for their own learning, regarding this as an important goal. It could also provide more opportunities to differentiate the curriculum ‘for both low and high achieving students’ The devices would allow the teacher greater capacity to tailor lessons to individual needs, particularly with self-motivated students where ‘you can differentiate without having to run it all.’

The class had moved to a different room that provided better wireless connectivity. It also had extra storage space with shelves in an alcove/storeroom. The devices could be stored there and recharged, freeing up more space in the classroom. The room also allowed for a more ergonomically sound set up. The students sat in rows, facing the interactive whiteboard and there was also some floor space that they could move to when appropriate.

The teaching focus remained mainly on basic computer skills and procedures such as opening documents, saving files, basic word processing skills and using the internet. These skills had been described as ‘poor’ at the start of the project. Students also had an opportunity to chat with each other using the devices and the teacher had emailed worksheets to students. Skill development was irrespective of Internet access and was linked to explicit teaching. It was, in itself, considered by the school to be a necessary component in the introduction of ICT and 1:1 eLearning in the classroom. It needed to be ‘explicitly taught, as part of a general recognition of the need to scaffold students’ learning’ and was regarded as an important part of the teacher’s role to facilitate students taking control of their own learning.

Observation of a class towards the end of the year provided insight into the teacher’s approach to explicit skill development during the delivery of a unit addressing the question: ‘How is Christmas celebrated in a different country?’ Students were required to search the internet for information and develop a PowerPoint to present their findings. The teacher used her laptop to discuss and demonstrate the search procedures and strategies and the various terms used when searching. Students showed a growing understanding of the technology and software being used, whilst at the same time learning about and discussing the topic of focus. When prompted by comments from the students, the teacher reflected on issues surrounding use of, for example, wiki answers. She discussed language used in PowerPoint presentations and highlighted the issues and requirements related to using information from the Internet.

When comparing similar lessons where the devices were not used, the teacher noted ‘...it’s slower [using the devices]: at 20 minutes they’ve [only] answered the first question (about what Christmas means, and how the question relates to the task and the information on screen). With a handout it would have all been done as a poster by lunchtime!’ At the same time, she also highlighted advantages of the 1:1 approach in allowing for differentiated learning, with students working at their own pace and to their own interests.
The use of the interactive whiteboard ‘made a big difference’ to the scope of activities that the teacher could include. It was preferable to working from her laptop using the data projector as it allowed her to be physically closer to the children on the floor. It also ‘increased [the students’] excitement.’

However, frequency of the computer use remained, overall, relatively low, mainly due to frustrations with connectivity and compatibility. Earlier in the year, the class was using the devices for two hours a day; but towards the end this had reduced to only about one hour a day. This compares with an average of two hours per week for the classes with a bank of computers (on average five per classroom) and access to the school’s computer lab.

Concerns around the assessment procedures were also noted by the teacher. The incompatibility of connections meant that students had not been able to save their work on the server and many were unable to save it on their hard drive. Nor could they print their work, which the teacher felt would have helped in her assessment of their learnings. From the teacher’s perspective, assessing student work on their devices was proving more time consuming and difficult.

By the end of the year the teacher’s laptop was connecting wirelessly. The teacher also felt that she was making more effective use of the interactive whiteboard although its use as a more interactive tool continued to be severely limited by the fact that its programs and those of the teacher’s laptop differed significantly from the students’ devices. Effective modelling of computer use, new software and particularly email, was compromised by the confusion when attempting to teach using a program different from that on the students’ devices.

The teacher had had the expectation that work would be emailed back and forth between teacher and students. However, this had not happened because of the infrastructural issues. By the time of the final visit the teacher was using Intel’s Mythware eLearning to distribute work to the students. However, students could only send their work back again by email.

Only a couple of online chatting sessions had occurred, as it was dependent on wireless connectivity. The class had, however, had some chat sessions online in the classroom, with a silent room and the communication projected onto the IWB. These were designed to get students used to the process, and the appropriate use of language.

The teacher had also involved students in the ‘Superclubs Project’, described as ‘a global online environment where children are taught how to communicate online and how to keep safe online’. Through this social learning network, students are able to build their own websites, publish work and become involved in discussion forums on specific topics. It was a trial project in which access was more easily attained due to their 1:1 eLearning classroom. The teacher commented that, after the initial learning in the classroom she envisaged students being involved in Superclubs more at home than at school. In the classroom she used one student’s page to demonstrate and prompt revision and discussion of what the students could do on their own sites. She noted: ‘The students are excited about it’ although she felt she did not really yet ‘know about the educational implications of it’.

Maintaining her students’ capacity to use pen and paper was a particular concern of both the teacher and the leadership team. Whilst conceding that the students preferred to use the devices, it was considered necessary for more work to be produced on paper in order to develop their writing and literacy skills. The teacher typically gave students the option to use the laptop or their book during many of the learning activities. The class had used both pens and the devices for writing, whereas Maths was always on paper. Assessment tasks throughout the year were also mostly done with pen and paper. The teacher was, however, apprehensive about national testing being in the written form and how this would be affected by a 1:1 environment.
She felt that the best use for the computers in the future would be for research and added that she wouldn’t use it for English or Maths, although it is ‘a good motivator for some kids, with games to support Maths’. Science topics were also considered appropriate for online work.

Significantly, the teacher stated that she could have achieved the same outcomes without 1:1 devices. However, the principal’s perspective was different, based on what she saw happening in the classroom and the outcomes of the students: ‘the results tell us, obviously it has been effective.’

The teacher considered that her teaching style will change in the future as she increases her communication with students, through email and other communication software, and her use of cameras and iMovie software. The Intel Teach Thinking Tools, although not used to date due to Internet difficulties, was also seen as a valuable tool for future use, to develop higher order thinking. The access to 1:1 devices was seen as important in making these various changes - she could not imagine doing so without them. When asked what she would do differently, the teacher said she would spend more time teaching computer skills, in particular using a typing program to develop the students’ keyboard and spelling skills.

**Impact on Student Learning**

The teacher noted changes to her students, when they used the devices. This included higher levels of engagement, interest and enthusiasm in learning, increased self motivation and a willingness to find new ways to learn new knowledge. She also saw an increase in peer teaching: ‘they feed off each other’ and in particular she noted that it enabled ‘some students to take control of their learning.

The students themselves spoke of ‘learning more’ through using the computers This included finding more information for projects, learning how to do PowerPoint presentations and use Excel, making tables, sending emails and using specific programs for learning such as those targeting Maths and touch typing. Having their own computer was seen as an advantage because they did not need to go down to the computer room.

Over the year, the students’ computer skills had improved markedly, evidenced in the end of year class level assessment data, which showed a significant increase for the 1:1 classroom. There were some students, however, who still needed more work on their skills as they were, for example, deleting toolbars, pressing the wrong layout button and ‘did not know how to fix problems’.

The teacher noted that students were still a little apprehensive about searching for information and that it was ‘problematic finding information at their level’. The assistant principal agreed that their research skills, particularly ‘inferring information and finding it’ were not particularly good, adding that ‘analysing and inferring was not easy’ at their learning stage.

Concerns were expressed in regard to the impact of 1:1 eLearning on the level of social interaction and collaborative work being seen in the classroom, as the relationship was ‘between the student and the computer, rather than between students’. It was seen as potentially detrimental if there was too much emphasis on using the devices. However, it was also noted that collaboration is often recognised as problematic when two students shared a computer, as the mouse holder tends to take control. In the focus group of five students, most noted that their main concern with shared or paired work was their lack of control over the background and settings. For example: ‘I’d rather have my own laptop and it’s more fun…because I want to do what I want to do on my own laptop, not what two people want to do’.

The students were very positive about their 1:1 eLearning experience. They considered themselves better at using the devices than at the start of the year. They spoke of the computer skills they had developed, particularly noting their improved typing skills, and the various sites they now had access to, including Superclubs and Maths websites. They all felt that they were
working about the same, with some feeling that could work faster but others seeing it as slower. They all agreed it was more enjoyable. One student summed it up with: ‘we’ve been learning more and we’ve been experiencing more’.

All wanted to continue using the devices for their learning. When asked what they would like to learn next they talked about looking at different topics, making CDs and photos, using it ‘whenever you want and in the car’ and ‘learning more about Superclubs’.

Home and School Links

The devices were not taken home during the year, disappointing some students as they had looked forward to this. The teacher had hoped to develop a class website that would have worked well with students working on their devices from home. However, due to the various delays in the project, the school was concerned that, ‘they had not been utilised effectively in class,’ and that there was ‘a need to accomplish outcomes’ within the classroom before taking them home. In addition, the initial offer to provide internet connection for families had not gone ahead, creating potential difficulties in gaining the most from the home/school links. The Principal noted that ‘the frustration is quite high…The most exciting thing for these kids was to take them home and we never got to that stage. We couldn’t…risk it.’

There were mixed feelings amongst parents. Some, while very supportive of the project, had ‘made a clear value distinction between their children using the [devices] to play games and to do school work’. Others were uncertain about or were not used to having dual responsibility for the computers between home and school.

4.1.5 Future Plans

From the principal’s perspective, a dedicated team made the project work, ‘for reasons of their own professional integrity’. When reflecting on the project overall, she noted that although the actual concept is good, the extent to which it was the most effective tool to implement the curriculum is uncertain. The school’s ICT plan for the next few years does not have 1:1 as an urgent priority for the whole school. According to the principal, ‘[It’s] not outshining all the other technology in the school…Our children need to have exposure to other technology [too].’

In 2009, the devices will be used for the whole year level, stored in the same place but available for all classes on that floor of the building, which is wireless connected. The school’s ICT policy is geared to giving teachers ‘more ownership of the process’. The library/ICT teacher will be freed to team teach and model the strategies in the classroom, mentoring all the teachers in the school over the course of the year. The focus will be on integrating ICT within all teachers’ pedagogy – using interactive whiteboards, banks of classroom computers, the 1:1 devices and the computer lab.

The school felt that the best option for classrooms was a combination of an IWB, the laptops and a knowledgeable teacher – ideal for explicit teaching.

4.2 School B

4.2.1 The School Context and Approach

School B is located in an outer metropolitan area. It has a student population of 538, which includes 12% of indigenous students and 48% from a range of ESL backgrounds. Its categorisation as a Socially Disadvantaged School has led to additional funding and staffing. In addition to the 24 teaching staff there are several welfare-related staff positions, including those related to supporting ESL students and students with learning difficulties and emotional disturbance.
Teaching and Learning Approach

Curriculum within the school is planned across Learning Stages, in line with the State curriculum structure where each Learning Stage covers two years of schooling. The composite classrooms work as a Stage rather than as separate levels, which allows the range of levels across the class to be catered for and encourages ‘buddying’ for project work and other activities. Literacy and Numeracy are key areas of focus. In all activities the school promotes the importance of ‘being a learner, being respectful and being safe’.

Personalised learning is central to the school’s approach. A database of all students includes key curriculum outcomes and specific items such as the national assessment results. There are also comprehensive individual files on all students involved in Learning Support Teams, which includes gifted and talented students and students with learning or social difficulties, disabilities and allergies. Personalised Learning Plans (PLPs) are developed and implemented in close consultation with the parents. This family involvement was considered particularly crucial and ultimately successful, in the development of PLPs for aboriginal students. Student growth is tracked and the Learning Support Teams meet weekly to discuss progress every week. Teachers are kept informed and supported by the Learning Support Team, providing them with a greater sense of how to work with the students and their families to deliver personalised learning.

The personalised approach in regard to ‘education and much more’ is seen at the school as the ‘difference between students engaging and not engaging’. According to the principal that is where the 1:1 eLearning project ‘fitted in really well’… ‘It enables personalised learning, students taking responsibility for their own learning and sharing this with families’.

The Focus on Technology

Although the school recognises that technology is an important part of teaching and learning, overall, use has been limited. Classrooms across the school generally have two computers each, although not all are reliable. There is also a computer laboratory and computers in the library.

The ICT coordinator, who is also the school’s technician and the Release from Face to Face (RFF) teacher, teaches the staff computer skills and specifically how to use those skills in the classroom. The school is considering the possibility of introducing team teaching with the ICT Coordinator, but has been unable at this stage to find room in the timetable. Some whole school training was provided by the department of education but plans to involve some teachers in the Intel Teach professional development were delayed.

Rationale for Involvement

Involvement in the 1:1 eLearning Project was considered an excellent way to promote and increase the use of technology in their school. The principal was particularly pleased that the project was focusing on primary schools. She considered that the younger students were at an ideal stage to introduce 1:1 eLearning because ‘early intervention was more likely to lead to optimum outcomes’.

The school’s Regional Education Office was also very keen to involve indigenous students and therefore offered to purchase devices for use by these students. They also offered support for the ICT Coordinator over the project period.

Nature of the Involvement

Two classes with a mix of Years 3 and 4 students have been involved in the 1:1 eLearning Project, although only one of these was studied in depth. Teachers interested in becoming involved were required to submit written Expressions of Interest. The two teachers were selected based on their enthusiasm for the project rather than their computer skills. They were interested to see how the use of 1:1 eLearning impacts across the range of students within the room and the teacher to be studied saw it as an opportunity for her and her students to ‘learn together’. The
Principal felt that careful selection of the teachers for the 1:1 eLearning classrooms was important in achieving the optimum benefits. She saw in these teachers high quality teaching skills and an understanding of the need to foster intellectual engagement in students. All other staff were ‘excited and very supportive’ of the project and very keen to be kept informed about of its progress.

As far as possible, the normal range of students was maintained in the two classrooms, although there was some deviation to increase the proportion of aboriginal students in each class. Within each of the 1:1 classrooms around 30% of the students were aboriginal.

**Expectations for the Project**

Although the teacher had limited professional development in the ICT area, she was enthusiastic about what was ahead and very keen to hear about new and relevant pedagogy. She anticipated that full use of the device, with access to the internet, would provide richer and broader learning, reinforced through activities such as ‘Real life maths in the world’. She saw how it could expand her ‘buddy’ approach to teaching and learning within the classroom and also considered it important that her students shared their learnings with students in other classes, becoming mentors and ‘teaching others how to do it’.

Whilst conceding that both herself and the school ‘won’t really know how to use’ the devices in the classroom ‘until they do it’, she wanted the students on the devices every day. The potential for 1:1 meant that the outcomes would be unexpected, ‘more will come out of it…[it] will certainly be more than an individual tool’. With the ‘possibilities across the learning areas being endless’, the teacher positively expected ‘something new every day’.

**4.2.2 Introduction of the 1:1 Devices**

**The Establishment Phase**

The school received the 1:1 devices in Term 1 and the students began using them on the last day of the term. Significant delays in commencing were due to the belated supply of a laptop for the teacher to use and also the lack of broadband and wireless connectivity. Major works were needed to rewire the school in order to establish connectivity. Although the teacher received her laptop in Term 2 the infrastructure and connectivity works were further delayed. However, throughout these delays the school remained ‘excited about the prospect of introducing the device and determined not to ‘get bogged down in the problems.’ The teacher used Term I to prepare the students for their arrival.

In Term 2, the students were using the devices in the classroom even though they could not connect to the Internet. It was an opportunity for the students to establish classroom processes and rules around use of the devices and develop their computer skills, including opening files, saving work, word processing and the use of PowerPoint. They were being used for project work and structured activities, in groups, individually and as a whole class. Most of the work done in class before and after the introduction of the devices was in groups. There were streamed reading groups, graded maths groups, and mixed ability writing groups. The teacher saw the devices working well with this arrangement because ‘they slide so easily into any programme’.

The introduction of the devices also provided an opportunity to further develop the ‘buddy’ approach, which was already used for reading and maths. This typically involved Year 4 students teaching the Year 3 students. However, the levels of computer knowledge and skill varied across the whole class so there were ‘experts’ from both levels that would assist others in using the devices.
**Management Strategies and Rules in the 1:1 Classroom**

Rules and processes around the devices incorporated the general rules for the school: ‘Be a learner, be respectful, be safe’. These were discussed in relation to the use and care of the device in the classroom and their responsibility for their own computer. With only two power points in the classroom, battery charging was problematic although when they were ready to take them home battery charging would to be done overnight.

**The Initial Impact on Students**

The introduction of the devices created great excitement in the classrooms and the students worked enthusiastically on them. Students were engaged and confident and this was particularly evident in some of the students with special needs. A child with a significant language disability, for example, found the device ‘both safe, familiar and very suitable’ as a learning tool.

Improvement in attendance and engagement was especially noticeable in the aboriginal students. This had been very evident from early in Term 1, when the preparation for and excitement about the 1:1 eLearning project was being generated.

**Initial Parent Support and Liaison**

An information meeting was conducted to inform the parents. The level of computer use at home was not high and not all had internet access. The parents were, however, generally keen and curious about the schools involvement in the project. Some expressed concern that the purchase and use of devices would limit the school’s commitment to ICT more generally. There was also initial wariness in regard to how much work would be done electronically, with concern that there might be ‘too much’ or that the students might be ‘playing all day’.

**4.2.3 Progress**

**Hardware and Connectivity**

By the end of Term 2 the project was a long way behind where the school had expected to be. Wireless was still not available but Broadband had been connected. However, the age and design of the buildings created difficulties. The classroom had two blue cables but this did not enable Internet access in the class, even though it worked in the staffroom.

The devices were seen as sturdy but considered ‘slow’, taking 3–5 minutes to start up. The small screen size was creating some vision problems for a couple of students so students were instructed to change the font size to overcome this. The lack of a CD-Rom drive meant that sharing of files, was done by USB while there was no internet connectivity. Over the year, eight of the 60 computers had stopped working and needed to be sent away for repair.

The principal expressed some disappointment at the delays in both the project and the implementation of broadband and wireless connectivity. She noted that the teachers were patient with delays and very calm about breakages. ‘They know they just need to keep going with what they have got’.

In addition, the interactive whiteboard they received as part of a government initiative, although potentially a most valuable aid in the 1:1 eLearning classroom, had not yet been installed as the school was on a waiting list to receive the technical support provided by the department. But the principal remained optimistic that problems would ‘be ironed out’, indicating that she is reluctant to ‘push’, because they are ‘an equity school’.

In the meantime, the 1:1 devices were being used regularly in the classroom. The teacher’s attitude, echoed by the principal, was to positively use what is available. ‘There are limitations, but ‘we do we what we can do with them’. The classroom was wirelessly connected three weeks before the end of the year.
4.2.4 Impact on Teaching and Learning

Using Technology in the Classroom

Routines had been established quickly. Students would come into class in the morning, automatically collect their devices and start them up, plugging in for recharging if necessary. The desks were in a U-shape to allow access to power boards and power points. When the devices’ power reached 30% or below, students moved to a desk with ready access to a powerboard. As a result they were often not sitting at their own desk, but this caused no concern as the students were flexible and considerate towards one another. Any occupational health and safety issues with power boards and power cords appeared to be at a minimum. The devices were put away in a locked cupboard at recess, lunch and overnight and the room was locked.

The main constraining factor was the lack of internet connectivity. However, the teacher was very positive about the achievements in the classroom and attributed this partly to ‘the time we spent setting it up... taking it slowly and putting the hard yards in at the beginning’. With the addition of an interactive whiteboard, by the end of Term 3 the classroom’s figuration had remained the same, but its orientation had moved from the blackboard to the Whiteboard. By the end of the year, the teacher was using the interactive whiteboard only, providing the capacity to increase the use of the internet with the class, even though it was not possible on the devices.

Prior to the devices, there were only two desktop computers in each class and the students spent an hour each week in the computer laboratory with the specialist teacher, focusing primarily on skill development and some introduction to the Internet and email. However, once they commenced using their devices, many new skills were generated from the intense work with them from Term 2 onwards. Students’ typing skills, for example, were further developed, with many students using most, if not all, digits by the end of the year. They were also stepped through the process of creating and formatting documents and creating folders, all necessary transferable skills applicable across the students’ learning. One student who previously had limited computer knowledge now felt comfortable: ‘It’s pretty easy to use this stuff now’, adding that it ‘got easy very quickly’.

The teacher felt the style of her teaching had changed ‘dramatically’, but not what she was teaching. The most noticeable change was in the way students now presented their work, using PowerPoint and Publisher. Her planning now included where the computer activities were required. However, she added that only some of the activities were planned, with other, ‘spur of the moment’ activities incorporated into her teaching and learning.

It was considered difficult to judge the extent of change given the lack of wireless connectivity and the consequential word processing focus of the teaching: ‘Without the wireless it’s just another mode of writing’. However, when asked what they would do another time, both 1:1 teachers commented that they would teach the basic ICT skills in the same way because of the range of students and variety of skills within the classroom. ‘I would still spend the time at the beginning of the year teaching the skills of the programs… you need to do that regardless of what you have.’

Learning took place over three sessions per day and the devices were used for part of each of these sessions. This included independent work, group rotation, and teacher-directed work. The device was used for many subjects, although not physical education, art or handwriting. The devices were not taken to the library but students had the opportunity to use the Internet on the library computers.

Within the classroom, for example, they were used in reading group activities, with book-related tasks such as prediction, characterisation and alternative endings produced in Word. Each day ‘Mentals’ or ‘Fast Maths’ was done on the laptop instead of students’ books. This was in conjunction with the interactive whiteboard, where either the teacher would write the equations
or a student was chosen to type them via the teacher’s laptop. Answers were provided by different students as students corrected their own work on their device.

‘Buddy work’ provided the opportunity to develop their learning products in pairs, although this did involve some disagreement about whose device was to be used. In more formal whole class activities, the teacher modelled development and use of PowerPoint presentations using a laptop, data projector and screen. Incidental learning opportunities also arose as the computers were used. For example, as they were creating individual PowerPoint presentations, the teacher addressed the whole class to ask why the Spell Check ‘doesn’t like mars and mercury’ on a student’s screen. This resulted in class discussions and student generated solutions: ‘they needed capital first letters because it’s a proper noun’.

Students were sometimes given the choice of book or device, especially during maths sessions. This always resulted in a mix, with no occasion where all students chose the device. This was due, according to the teacher, to the length of time it takes for the devices to start.

During the final visit, students were working on an extended project on explorers and the First Fleet. They were using PowerPoint to write stories and develop presentations on their learnings. Images were provided by the teacher via USB. When asked about the benefit of 1:1 over a bank of classroom PCs, the teacher noted that there was ‘a big difference, definitely’ as they can do independent work rather than doing group work. ‘When doing group work with shared computers, they all want to have a turn, be first.’

The potential to do so much more when the students finally gain full access to the Internet was well recognised by both the teachers and the Principal.

**Impact on Student Learning**

The teacher was very positive about the impact of the devices, particularly in relation to attendance and engagement levels. ‘It’s not the only reason, but I do believe that [the device] has contributed to [the students] attending school more regularly. The kids have come a long way with it’. One student for example, with 50–60 days of absence in 2007 had, in 2008, reduced this to 21 days.

Enthusiasm was given as a further indicator of increased engagement, as was the students’ ability to undertake independent work: ‘usually if I set the task, whatever it may be, after we’ve one our leading work on the whiteboard, they’re right into it, they’re engaged with their work’. A number of Aboriginal students were placed in the 1:1 classroom as a way to improve their engagement, attendance, literacy and numeracy. According to the teacher ‘It’s certainly worked with them.’ Attendance records, for example, had improved greatly, year on year. The lower ability students in the class had particularly benefited. The reading level of one student, for example had moved up substantially over the year as the ‘engagement has been there for her’. Another student, with attendance and learning issues, was now very engaged in his school work, often choosing to do work on his device when the opportunity for free time (including games) was offered.

By the end of the year, the students, according to the teacher, were calm, confident and very positive with their devices. They were no longer ‘panicking if something goes wrong’. Instead, they would quietly bring it to the teacher or other students to fix and then continue.

The teacher also noted increased creativity and different ways of thinking in her students, particularly in their presentations. She felt that the quality of their work on the computers was improving all the time. For example, when doing their presentations, they were thinking about how to improve on what they are doing and were able to ‘work out what was needed to do this’.

The principal also detailed the advances being made by some students who had come to her office with their computers to show their science work. They had been working on investigations involving making predictions, gathering data and plotting graphs on the computers. According to
the principal, ‘their enthusiasm was just oozing out – they are incredibly proud of their work and keen to talk through how they made the predictions gathered the data and made the graphs’. An aboriginal boy, who is generally fidgety, disinterested and not very communicative had done some excellent work and was very keen to talk about it, explain what he had done and show her on the computer other ways of doing the graphs.

There was a range of computer skills across the class, with some very experienced as they have computers and broadband at home. Without Internet access, these students, who already had ICT skills, had ‘now reached the limit of what they can do’ in the classroom. In contrast, others did not have the opportunity to access technology at home and were therefore ‘quite content - still learning new things.’ According to the principal, ‘their gratification really shows – they have loved it’. She also noted ‘how clever students are’ with the computers: ‘watching them explore programs [it is evident] they are not afraid’.

The ICT skills of all students continued to improve. By fourth term, for example, when the students were instructed to put a new document in columns, ‘95% of the class could do that unaided’ while only ‘a couple with learning difficulties’ would need help. According to the teacher, their presentation skills were showing ‘a more sophisticated level of presentation’ and they were ‘prepared to get up and speak’. She felt the device had given them the confidence to do this. For some who were not confident in their writing skills, using the devices had led to notable improvement in their work. They were producing ‘lengthier pieces of writing’.

The teacher ascribed the significant successes in the class to the 1:1 eLearning Project. The presence of individual devices in her classroom provided the motivation for these students to attain more than just ICT achievements. She was ‘impressed with the kids’ hard work and ‘could see growth’.

When asked about the advantages of 1:1 eLearning for students, the principal responded that there was ‘no comparison’ between students having ‘their own log of work on their computer and having to share. She saw it providing students with ‘their own record of learning’ and felt this ‘ownership is paramount – they don’t have that when [computers] are shared’.

The students themselves felt they were learning more with their devices, although the examples they gave related mainly to learning computer skills such as how to create, save, alter and publish using the laptops. One for example liked the way he could set up his writing ‘because normally, just in books, you don’t centre, or change font…but on a laptop you can mess around with the font and the colour’. Another felt it had ‘changed my learning’ because ‘I don’t get that much written down, …but every time I’ve been on my laptop I’m getting … more words down’. Many referred to the fact that when using the device their hands did not get sore as it is when writing with pen and paper.

Overall the students felt that it had made learning ‘more fun’ and was ‘easier’, particularly for writing. One for example noted ‘last year I only had books and I wanted to stay home heaps. But this year I wanted to come to school heaps’. Another felt that it ‘helped me more in my learning - because when we do it on the laptop I think it’s faster and I think it’s better for me because when I type it down I can work out things’.

A student survey at the end of the year identified other changes occurring in their learning. They were asked to consider a range of statements about their learning experience with their devices and indicate the extent to which the statements were more true, about the same or less true when compared to their work without the devices. There responses indicated that:

- 95% were more proud of their work on the devices,
- 90% had gained more new knowledge,
- 84% found school work was easier,
- 79% had put more effort into their work and had produced higher quality work,
- 69% were more motivated to complete the tasks, had checked their work more thoroughly before submitting it and were more creative in what they produced, and
- 63% had learned more from people outside their school

All others (except for one in two of the statements) indicated that these aspects had applied equally with and without the devices. Very few felt that they were ‘thinking about things more deeply’ or had increased ‘gathering information to solve problems’.

In regard to collaboration in the classroom, the students indicated that they were able to draw on others for help if needed, particularly when learning new skills. They also spoke of the students who, when they had finished would ‘go around and ask people, ‘Do you need any help?’”.

**Home and School Links**

The Principal believes taking the computers home is an important opportunity to share the 1:1 eLearning experience with the parents. ‘Even the parents who are ‘technology savvy’ have been blown away with the speed of the computers’. However, only students involved in the after school Library program (discussed below) had taken them home by mid year. With the lack of connectivity in the classroom, students were not well prepared to use the devices with the internet at home. In addition, the school was alerted to the need for updating to a more suitable anti-virus protection on the devices when a student returned to school after the Library session with a virus on his laptop. However, all students began taking them home in Term 4, after a contract was signed by student and parents/carers. Shopping bags with the school logo were purchased to protect the computers as they were carried home.

When asked about how they used their laptops at home, students commented that they did homework first and games second, recognising that this was part of their signed contract. They were conscious of the need to take responsibility and care for their computers. ‘There is something different about taking it home because you have to take care of it. If it’s not charged you don’t use it for the day and [the teacher] gets angry with you’.

Parents involved in the focus group discussion were extremely positive about the 1:1 eLearning Project and its impact on not only their children but also their whole family. They reported greater confidence in their children both generally and with computers. They described their child’s excitement, active learning, pride in having a laptop, and amazing skill development and achievement. They were amazed to see their children using two hands to type. The students were particularly careful with the devices when they were at home and especially ‘took responsibility around siblings. The parents recognised that ownership of the devices was teaching them responsibility.

The portability and size of the devices were considered by the parents to be most suitable for students. The device was described as a learning tool, not a toy, by the parents as this was how the students saw them. They highlighted significant leaps in their children’s engagement with their learning. One example was given by a parent who had taken her daughter out of school for a beach holiday. The student insisted on taking the computer with her (despite attempts by her parents to dissuade her) and doing her work daily in the caravan.

Parents also noted the benefits for their whole family as a result of their child’s involvement in the project. It increased the interaction between them and their children, providing ‘a talking point’ as they would sit down with their child and discuss what they were doing and learning. It had also inspired some families to buy a computer for home. Having seen the possibilities of the Internet it ‘opened our minds to the importance of computers’. The ease of storing information on a USB was also remarked upon. When compared to work on paper, it potentially provided a full and more permanent and easily storable record of the work students had done over the year –
to look back on in the future. Dealing with ‘siblings who did not have a computer and the constant problem with ‘recharging’ were the only difficulties mentioned by parents. The fact that they would not have their device in the classroom next year was a disappointment, although they recognised it as fair.

Community and School Links

The implementation of the 1:1 device also increased the school’s opportunity to link to the broader community. An inter-agency project involving 10 students from the two 1:1 eLearning classes, was initiated by the local Library. The project, designed to educate parents and students about using the Internet, was conducted for an hour over five Wednesdays at the local library.

Ten selected students, screened to ensure a certain level of computer skills, attended the after school sessions along with their parents. They used their devices during these sessions (so needed to take them home on these nights) to work with their parents on the project they were doing at school. This further generated the home/school links and assisted the parents to understand what the students were doing with their devices.

The program increased awareness of the resources that were available for families and teachers through the local library, considered most important given the low socio economic status of the area. In particular, this included free access to an online tutor service (live) every evening, which provided assistance with a range of information and help for students and their parents in, for example, maths at different year levels. The principal felt the involvement of the parents in the library activities had increased understanding of adult education at the school and the community level. It had also reduced the perception of the library as ‘silied’ within the community and had expanded the schools resources and community standing.

4.2.5 Future Plans

The principal’s hope is to ‘get to the point where the price of the device comes down so much that it is accessible to all. ‘Children could look up whatever they want to know [which] leads to all sorts of areas of pursuit – it is almost their right to have access to that knowledge.’ With this comes the need for teachers to teach them about the right way to approach their learning and ‘to know where that learning is profound and where it isn’t’. With the opportunity to store all their personalised work they also needed to ‘learn what to keep and how to store and protect it from viruses’.

She also spoke of the type of learning that could take place if students were networked with each other so that ‘there is a team approach to their work but what is recorded by them is their own’. This could lead to links to other schools and communities, where students were responsible for their own learning ‘while still working in that very important teamwork and collaboration...That would be the ideal situation’.

She plans to put every PLP on a thumb drive, to be used by the students. If the individual devices were available, the PLPs would be loaded on to them for students to access, work through and share, and parents could share and build on this when the computer went home – increasing their sense of ownership and responsibility for their child’s progress.

In the immediate future, decisions were being made about the location of the devices in 2009. The students in the 1:1 eLearning class will not be staying together as a class next year, so the current devices will be placed in a different class. Some parents indicated that they would like to buy them but the principal felt they were ‘not worth buying as their lifespan is uncertain’.

Calls for expressions of interest in using them in their classrooms next year have been made to the teaching staff. Parents are generally positive about supporting areas of need and the school philosophy is strongly established in regard to equality and addressing special needs. It is also well accepted that ‘if the resources are limited the resources should be shared’. Aboriginal
students were targeted this year. If the Special Support Class ‘puts up a strong enough case they may go there, as they would help those students’.

The Principal considered that, as a learning tool, individual computers were ‘super’. However, from a funding point of view, interactive whiteboards would take priority as they can be distributed across more classes and will therefore have a greater impact. Ideally, if she had the funding, she would add individual devices, ‘I do not doubt for one minute that it would be fantastic for every kid to have a laptop for their learning.’

4.3 School C

4.3.1 The School Context and Approach

School C is a relatively small school (205 students) situated in a rural setting. Students represent a wide range of socio-economic backgrounds, which reflects the growing number of students being drawn from the increasingly sprawling suburban areas of nearby towns.

Teaching and Learning Approach

The teaching, most of it in composite classes, focuses on individual learning across the curriculum stages. Curriculum planning occurs in year levels and learning areas although the school is currently revisiting the use of integrated units. Across the staff, there is a range of teaching approaches used, with some taking a challenging, engaging and high-level thinking approach.

The Focus on Technology

The school has demonstrated a high level commitment to the use of technology in teaching and learning. Technology integration is considered important in curriculum development. Computers are located in all classrooms and the computer laboratory is accessed regularly by all classes. They are used extensively throughout the school as tools to enhance learning in all Key Learning Areas. Four teachers, including the 1:1 teacher, have attained their ICT Pedagogical License, which involves undertaking specific levels of technology focused professional development and demonstrating their understanding and use of 21st Century teaching practice and digital pedagogies.

The school is running the newly developed Department of Education offsite technical support and ICT management processes, which can only be used by schools that have passed a required ICT technology infrastructure benchmark. There have been significant purchases of computer hardware and software resources to support curriculum delivery and there are a proportion of teachers who have achieved the required level of professional development. A computer assistant, acquired locally in conjunction with neighbouring schools, is employed on staff for one day per week.

A variety of programs to research and present information are used in teaching and learning and activities around email, forums and chats are conducted in classrooms. Classrooms also have access to a range of other digital media including data projectors, interactive whiteboards, digital cameras and video cameras). At the end of 2007 all teachers in the school received laptops.

Rationale for Involvement

The Principal was instrumental in the school’s involvement in the 1:1 eLearning Project. She had both professional and personal interest and expertise with computers and had introduced ICT in other schools where she has been principal. Importantly, there were also teachers at the school very willing to support the school’s involvement. The state wide offsite technical support and ICT management processes, recently introduced by the Department of Education would, it was felt, make possible a more intense use of computers in the classroom.
The 1:1 eLearning Project was therefore regarded as a timely opportunity to further motivate and enhance learning at the school. The Principal saw it as ‘an amazing opportunity to be up-skilled’ and also a way to shift the community perception that country schools were not as well resourced and were slower to adopt new ideas when compared to the larger city schools. She was also keen to examine the impact of 1:1 eLearning with a view to replicating the experiences more widely within and beyond her school.

**Nature of the Involvement**

The devices were located in a Year 3 Classroom of 26 students. The teacher was very keen to take on the challenge of the project. Technology had been a strong component in her teaching and learning approach in the past, including the promotion of online communication and collaboration with her students and between her students and a ‘buddy’ class in New Zealand. She had achieved her ICT pedagogical licence and, according to the Principal, ‘a good balance of structure and flexibility’ had been a feature of her approach in the classroom.

The class consisted of the full range of students in regard to achievement and behaviour. Half came from a 2007 teacher who had a very flexible approach to learning, including elements of an inquiry-based pedagogy, and the other half from a teacher whose approach was very structured. Both groups were described by the teacher as ‘not phased at all by technology’.

It was planned that all teachers would spend some time with the 1:1 teacher in 2008, so they too could be up-skilled and mentored in regard to specific ICT pedagogy.

**Expectations for the Project**

The teacher considered that the devices, when fully operational after wireless connection, had the potential to make a difference to the way students learn. In particular she saw stronger crossover between the home and school learning environment and was keen to explore how the devices could be used for extra curricula activities. She also felt the teacher/student relationship was likely to change, with students teaching the teachers and students and teachers learning together.

She expected challenges associated with the management of a digital curriculum. ICT skills were not considered easy to teach as they needed to be ‘embedded in the purpose, so learning can be both acquired and demonstrated’. More specifically, she could see issues associated with, for example, helping a new student who moved into the school to adapt to the new way of learning or enabling a relief teacher to manage a class that was focused on using computers particularly when faced with their questions on forgotten passwords etc. She added, however, that she was looking forward to exploring ways to overcome these challenges.

**4.3.2 Introduction of the 1:1 Devices**

**The Establishment Phase**

The devices were introduced into the classroom mid Term 1. The room was significantly rearranged to accommodate the PCs. Tables were now in groups (6-8 per table group), rather than rows. This new set up substantially increased the open floor space in the room.

Wireless connectivity was not yet available so the students were involved in offline activities. It was expected that wireless connectivity would be set up midway through Term 2. In the meantime online activities were conducted with the class or in groups, via the teacher’s laptop. The Virtual Classroom was also being set up through ‘The Learning Space’ a Virtual Classroom in which students’ work can be uploaded, discussion topics added, and student progress assessed. It included individual student digital portfolios, chat and blog sites and email.

In the first few weeks, the teacher felt she was running out of ideas, but added ‘as I go along I keep getting more and more ideas’. In particular, she was recognizing the value of the PCs in individualizing student’s learning. She was exploring the capabilities of the machines and was
also keen to explore extra curricular options. Although not able to use the PCs online, the teacher saw this initial period as an important opportunity for the students to become familiar with their laptops. It provided time to establish processes and rules in their use and care.

The main focus of the students’ work initially was on a project around a Thai elephant sanctuary where the teacher had previously worked as a volunteer. The class had established an online relationship with the Sanctuary. They were researching (at this stage through books) and developing PowerPoint presentations related to Elephants.

**Initial Impact on the Students**

Early in the implementation phase the teacher was seeing a positive impact on her students. Students were most excited about using the PCs and behaviour in the classroom, described as good to begin with, was even more settled when they were being used. According to the teacher, the students’ communication and collaboration skills had increased and the class was working very well together. In particular they were problem solving together and peer tutoring was more common. Students with behaviour or learning problems were notably more focused and productive when using their PCs and, overall, students did not need as much direct instruction when completing their work.

**Initial Parent Support and Liaison**

An information evening for parents was attended by Department of Education’s 1:1 Manager and the Acting ICT Regional Manager, who provided the background and philosophy of the project. A parent handbook was also provided which included answers to 140 Frequently Asked Questions the parents might ask, including care and responsibility for the devices. Further sessions with parents were planned.

The devices were expected to go home half way through Term 2, allowing time for students to learn how to care for the device. Parents were expected to pay $25 a term as insurance against total loss of the computers. The school purchased satchels for the devices as they felt they were too big to fit in backpacks.

The majority of parents were very supportive and interested in the 1:1 eLearning Project, although some were ‘feeling challenged’. Parents were invited to be in the room during the first days of the device being used and have continued to be welcomed.

**Management Strategies and Rules in the 1:1 Classroom**

Access to power boards, power points and blue cable points was made available at each group of tables. Once the laptop started beeping students would plug their computers in to recharge them. Students used USBs to transfer work to the teacher’s computer for printing which minimised unnecessary printing and was considered an important conservation and cost measure. The computers were put away in a locked cupboard in a room between two classrooms at recess, lunch and overnight. Set up and putting away procedures became routine for the students, taking no more than five minutes at the end of the day. Rules and processes developed naturally as the need for them arose.

**4.3.3 Progress**

**Hardware and Infrastructure**

By the end of Term 2, the school was experiencing ‘a great deal of frustration’ due to break down of the device hard drives. Sixteen of the original computers had broken down, although the Department of Education was able to provide replacements while the others were away being fixed.

There was also some difficulty with internet connectivity, although according the principal, ‘things were being sorted’ and they hoped to be fully connected by the next term. At one stage
only one device was able to access Outlook. Due to the breakdown of the computers and also their small hard drives, student work was being saved to the Education Department network. In the meantime the use of technology continued in the classroom where possible. Despite the technical and equipment difficulties, students and the teacher remained very enthusiastic, continuing their Elephants Project.

A decision was made to delay having students take the devices home until ‘after all things are humming’. Firstly, the school felt the need to be cautious as problems, such as the computer breakdown currently occurring, would ‘put parents off’ and they would be ‘more likely to be negative’. They also felt that the computers should not go home till the students were more proficient with them. The online connection was considered important in the home/school interaction and this was problematic when they did not have wireless connectivity at the school.

By mid Term 3 the class had received the replacement computers and wireless connectivity was completed, following significant delays and problems in acquiring technicians to undertake the work. The computers were being used regularly inside the classroom and also outside, where wireless was available from the closest end of the nearby sports oval.

The computers were now generally quite quick to connect to the Internet and when individual machines were too slow, the student would connect by available blue cable. Problems accessing the internet and overloading had ceased. Although not considered obstacles, the need to use multiple passwords as part of the security set up for the department network was considered an ongoing issue and accessing the Learning Place was sometimes slow.

By this time the processes and rules were becoming embedded in the classroom activities. They included not touching the screen, keeping the keyboard clean, no sharing of passwords and no use of ‘silly or bad words’, no-one else was allowed to use the device, especially siblings when it goes home and students were not allowed to download anything onto their devices.’ Another important rule was the ‘no real names in common places’ rule that was designed to protect the students when in cyberspace. To this end a list of code names had been developed by the teacher.

**Change of Leadership**

In Term 3, the Principal at the school was seconded temporarily to another position, although remained keen to be involved in the project. A temporary Principal commenced at the school. He had only recently returned to working for the State Department of Education so was familiarising himself with the use of ICT in schools.

**4.3.4 Impact on Teaching and Learning**

**Using Technology in the Classroom**

The teacher was very enthusiastic and confident about ICT use in the classroom. When asked if the way she works had changed, the teacher was emphatic that it had. ‘My classroom’s set up completely differently. We do a lot more common group work, I suppose you’d say, and a lot more independent work too. My planning has completely changed’. She added that in true inquiry pedagogy style her planning concentrated on the start of projects or topics and was then more open ended to allow students’ self-direction.

Although the teacher’s training and early professional development had not focused very much on inquiry processes, this approach had mostly emerged naturally from her teaching practice, ‘I have focused on the pedagogy behind using computers’. In addition, her ‘pedagogical licence’ gained through a series of professional development, had concentrated on how integral ICT was to learning and teaching. Her professional development in the area was ongoing. Over the year, she had participated in a number of professional development sessions involving teachers drawn from regions across the State. She was also involved in a trial designed to increase individualized
learning in maths through the use of ICT and was providing professional development to regional teachers on aspects such as digital storytelling.

The teacher regarded the Learning Place as a significant benefit. ‘It’s amazing for the scope of things you can do on it, depending on how technologically advanced you are. ‘I have the time. I love it’ and ‘the students are just so motivated, they love coming to school…they love learning.’ During the Olympic Games for example, the activities page had notice of upcoming online chats with Olympians from their State. She also noted the value of the control planner and the dashboard, which allowed the teacher to see how long students had been on the site, how often and when they last accessed it. In their Virtual Classroom on the Learning Place, the teacher would put up literacy and numeracy work as well as students’ homework. ‘It’s great…the program itself is fantastic’. The discussion board was also used extensively in the class, comprising 40% of all activity.

The teacher was innovative, exploring alternative approaches where needed. She used different websites when creating links for students, particularly when the usual links became slow or cumbersome. She would sometimes bring in her personal Wii for the students to use, and investigated how it could be made ‘to work the same way as an interactive whiteboard’.

Peer tutoring and guided discovery were central to the teachers approach in preparing students for 1:1 eLearning and ensuring they continue to become effective users of technology. ‘I don’t teach skills. I give them a task to do….we do all the learning behind it [and I explain] this is what I want you to get out of this task.’ She did not specify that it should be done in word or PowerPoint or tell them how to use these programs. Instead she let them ‘discover it themselves’ which resulted in students working together and teaching and assisting one another. ‘The only thing I’ve taught them is home keys. Everything else they have picked up themselves…some children had no skills at all. I want these kids to be risk takers and not be afraid of it. Try it out. That’s the best way to learn. Jump in with both feet’.

By the end of the year the teacher felt confident that this approach had been successful. She strongly believed in giving control to the students ‘Let them push buttons and discover “I did the wrong thing”, and let them try and fix it themselves … ‘I find they pick things up a lot quicker.’ In contrast she felt that with teacher led instruction students feel they need to ‘sit there waiting for their next instruction’, feeling that they ‘can’t push that button in case something goes wrong’.

The teacher also recognised the importance of learning through games: ‘Games are how they learn. It’s their world. They were born with games in their hands’. She therefore incorporated a range of games in her pedagogy that were related to the topics of focus.

Over the year, the students worked on several integrated curriculum projects. As part of the Elephant Project, online discussions had taken place with the Thai Elephant Park. Although online chatting or Skyping was not possible due to technology issues at the Thai end, the Thai contact would access the Department’s Virtual Classroom and answer questions posted by the students. The Project culminated in the development of a whole-class movie about Thai elephants. Photostory was used as the platform for exploring movie maker. The movie won 2nd prize in the junior section of the Dreamworld Australia Film Festival.

A project on the Olympics resulted in the development of non-fiction picture books using Publisher, Word and PowerPoint, accessing the Internet and downloading Clip Art. The teacher modelled activities on the screen and showed the sites available for them to use. Discussion about copyright and acknowledgement was undertaken as it arose in these sessions or as the students were accessing images from the Internet themselves.

The students also used Quest Atlantis, an international learning and teaching project that uses a 3D multi-user environment to immerse children, ages 9-15, in educational tasks. Students were
typically very positive about these activities, which they did both at home and at school. It opened up a range of opportunities to explore and learn about areas of interest: ‘You can do any sort of quest…you can do a quest about horses, or the ocean’ One student, however, had difficulties using it as ‘these are tiny [devices] so it won’t work on them’.

The teacher also introduced chat rooms to the students, demonstrating aspects of chatting on the interactive whiteboard. Chat rooms were then established to be used for homework and when working on projects ‘I use it as a reflection tool so they can tell me what stage they’re up to and any other information they would like.’ In the Learning Place ‘the kids can be a lot more honest in them, whereas face to face they hold back.’ Towards the end of the year the teacher was planning on starting chat room communication with other schools.

1:1 eLearning was, according to the teacher, very compatible with the national curriculum: ‘It fits so easily. Even when I was doing my Year 3 test with my kids this year, I put it all on the computer and they were more engaged with it because it was on the computer. I kept all my plans and outcomes and I was able to adopt it for the computer.’

She commented, however, that without the devices the students might struggle in recall test conditions. The students were comfortable working on pen and paper if instructed to because they knew that their devices were still available. However, ‘if I took their devices away, they’d be quite devastated and wouldn’t be motivated to work. They’ve taken on ownership.’

**Impact on the Students**

Students’ increased enthusiasm and engagement in their learning, noted in the early implementation phase, continued over the year, despite some of the earlier technical difficulties faced. The students were very enthusiastic about using the computers, sometimes keen to continue their work after the bell went for a break. According to the teacher, when the devices were off for repair the students were adaptable. ‘They think they’re so lucky to have the opportunity. It’s a great incentive.’ Students will work in pairs, or use the teacher’s laptop. ‘They would rather do that than not be on their devices.’

Students in the focus group discussions all felt that having their own device had made their school work much more interesting, adding examples of the work they were doing:

- ‘Mathletics [is the best thing], encouraging us to have fun while doing proper math’.
- ‘Now we say ‘’Yay” to do our non-fiction picture book on the laptop’
- ‘Word’s not really different to a book, but with publisher…you can make it into a book’
- ‘We can do lots of things on them. Instead of on a piece of paper, we can type on the Word.’

They also felt that it enabled them to ‘work harder’ and ‘get more work done…making us be really happy when we’re using them, even when it’s…hard work’

Some commented on how easy it was to use the computer. One considered it better because ‘when you write it takes a really long time, but when you’re typing it takes only a few seconds. Working on his picture book, another confirmed that the device was easy to both start and search on: ‘We use it…everyday to do some work and stuff…it is really easy to use’. Students were also proud of the computer skills they had developed. One, for example ‘used to be really bad at computers’ but was now able to help her mother when she has ‘troubles’ on her computer. ‘If her computer won’t turn on…I’ll turn it on for her. If she loses something, I can get it back for her’. She had also been able to ‘teach my brother how to save things.’ Another student noted that ‘teachers worked differently with the [devices] …they show us more on computers than on pieces of paper.’ He felt that teachers who use computers are better teachers. Asked to comment on what school was like before she had a device, another student said, ‘It was kind of boring because everything was on paper.’
Students were particularly positive about the Virtual Classroom site set up for their class, seeing it as a place where ‘you learn’: ‘We go onto our classroom thing [virtual classroom] and [the teacher] writes questions down and we answer them [on the website].’ They were, overall very proud of their achievements.

One student, when asked to compare the work they were doing prior to having the PCs, felt what they were doing now included ‘the same kinds of things but just on computers’ She then added ‘sometimes we type our poems on computers and at the moment we’re making a movie called My Year in Junior E.’ The only thing she could think of that couldn’t be done on the computer was handwriting.

Overall, there was strong evidence that the students were taking more responsibility for their own learning. The teacher commented that ‘the children create their own learning a lot more, because they have access to the Internet…they’ve got more scope to learn about what they want to and there’s more information out there that they can access.’ Collaboration, cooperation and peer support had increased immensely and the students were producing high quality work. Their computer skills had increased along with their confidence and understanding in solving problems and gaining new knowledge.

It appears likely that this was attributable, not only to the students’ access to their own computers, but also to the teacher’s very relaxed yet thought out, experimental approach that recognised the innate desire of the students to play, to learn and take control of their own learning.

**Home and School Links**

By the end of Term 3 the devices were being taken home by the students. They were being used in a range of activities at home, including a continuation of the project work they were doing at school, which was typically open ended and student self directed. The teacher also used the class website to set up specific homework tasks for completion and the students were becoming involved in class online chat sessions from home. Students were able to decide whether or not they took their computer home. One for example, who was very positive about having the device in the classroom, decided not to take it home as much as she preferred having ‘time with Mum and Dad’ and playing with ‘real people’.

**4.3.5 Future Plans**

Next year, in a team teaching arrangement involving the 1:1 teacher and a colleague, a larger cohort of students will share the devices, together with additional desktop computers that were previously available across the two classes. This arrangement was based on a resource and funding decision but there is an eye to returning to 1:1 eLearning in the future as many teachers at the school are generally disappointed that it is not expanding. In the meantime, the teacher has some concern about the way her students will adjust back to sharing the computers with others and not having the freedom to work on a computer whenever they choose to. She is however looking at the new arrangement as an opportunity to develop new practices with another teacher and perhaps encourage the other teacher in using technologies more through the class.

**4.4 School D**

**4.4.1 The School Context and Approach**

School D, located in a large regional town, has two neighbouring campuses - a junior school (Prep to Year 2) and senior school (Years 3-7). There is currently an increasing diversity in the socio economic backgrounds of the students. Due to the mining boom, house prices have climbed rapidly and, as a result, the younger students are increasingly from families at a much higher socio economic level than those who have been at the school longer. This is also leading to a
parent population that, compared to previous years, is more involved in the school. There are only six ESL families in the school.

**Teaching and Learning Approach**

The school has based its curriculum planning primarily on year levels and is guided by the Essential Learnings in the State curriculum development framework. It has a strong commitment to the Department of Education goal in ‘developing learners who actively seek to understand complex issues, critically evaluate and sort information, and are able to creatively apply what they have learned to new situations, build expertise and design solutions.’ Weekly year level curriculum planning meetings are conducted with staff.

**The Focus on Technology**

Technology is integrated into all curriculum units, computers within pods in classrooms are used to assist learning, the Internet supports student and teacher research and digital cameras are used to develop critical literacy. The development of a digital curriculum is currently underway.

The Principal has taken on the role of ICT Coordinator. He is strongly of the view that the use of technology must be embedded in a new way of teaching and learning, rather than being a replacement tool to continue the work that was done with a blackboard, pen and paper. He is concerned for example that interactive whiteboards as a learning tool in the classroom often do little more than ‘just support traditional teaching.’ unless teachers are given adequate professional development in their effective use.

The school is running the Department of Education state-wide offsite technical support and ICT management processes, which can only be run in a school that has passed a certain ICT technology infrastructure benchmark. The whole school is networked and the school is developing a digital curriculum to be ready by mid-year. ICT training for staff has a high priority at the school evident in for example the fact that all staff completed the Department of Education ICT Pedagogical Certificate as a group in 2007. A detailed ICT Professional Plan for the school was in place.

A computer laboratory is currently being built on the P–2 site, based on the belief that a single site for ICT work does not cut into teaching time, whereas the unpacking and repacking of equipment that is shared across classrooms can reduce the actual work accomplished. A new facility was also an essential requirement for staff training in ICT which was considered ‘almost impossible without a laboratory’. It would enable staff to extend their training needed to extend their Pedagogical Certificate to the next level of Pedagogical Licence.

**Rationale for Involvement**

The principal is the driver for the project at this school. His enthusiasm for the project and previous experience with 1:1 eLearning led to the school’s involvement. The Principal integrated the first primary school 1:1 program in The State in 2005 and had continued to be an active leader and supporter of 1:1 eLearning, working closely with the Department of Education in the professional development and preparation of leaders in the approach.

The 1:1 eLearning Project was seen as an opportunity to introduce the approach in his school and, as a consequence, support positive change in the teaching and learning that takes place in the classroom. He regarded collaboration as the essential factor in integrating 1:1 eLearning in the curriculum. A 1:1 device ‘is underselling the kids if they have to do exactly the same’ as every other child in the room or the state, ‘you can’t get trapped in content’. He recognised that this collaboration ‘will be noisy if it’s working well’. He also felt 1:1 eLearning changes the way a

3 Department of Education, Training and the Arts, P–12 Curriculum Framework, Minister’s Forward
teacher plans, providing the opportunity to increase real-life learning, improve teaching in the Technical and Arts Key Learning Areas and make home/school communication easier.

The device for this project was considered by the Principal to be very appropriate for classroom use in terms of design, appropriateness, solidity, rigidity and price. He also noted that they were less attractive to potential thieves when compared with more expensive versions.

**Nature of the Involvement**

The devices were located in a Year 3 Classroom of 26 students. The classroom teacher was chosen because the Principal felt ‘he looks at the world differently’, has an ‘open mind, is passionate about the kids learning’, ‘flexible and prepared to have his lessons go belly up’ and ‘reflective about his practice’. His class represented the full range of students in regard to abilities, learning styles achievement levels and behaviour.

**Expectations for the Project**

The principal and the teacher had high expectations about the differences that the individual devices would make in the classroom. In particular he envisioned a teaching–learning relationship that ‘won’t be as top down’ but instead a lot more emphasis would be placed on students leading their own learning. There would be a lot more negotiation and individualisation of the learning and sharing and collaboration between students would increase. Both the teacher and the principal recognised that this would require significant changes to the style of teaching and mode of delivery in the classroom. ‘How to change from how I normally teach’ was the teacher’s greatest challenge. He also raised concerns about assessing the students in a situation where the broader curriculum planning is still shared but the approaches to delivery are vastly different.

**4.4.2 Introduction of the 1:1 Devices**

**The Establishment Phase**

The devices were introduced to the class towards the end of Term 1. Although the Principal had been trying since December 2007 to get the school re-cabled, partly in anticipation of the 1:1 project, this had not yet occurred.

Introduction was delayed to give time for the class to settle and to learn the basic classroom rules. Daily use of the devices over this introductory period ranged from ‘not at all’ to ‘all day’. Upon reflection, the classroom teacher thought the computers could have been introduced earlier. Although wireless was not yet available, the time on the computers was very valuable. Students needed time to become familiar with the computers, to learn the new set of rules specific to the laptops and establish the processes around file and data management.

Guiding the students through the rules helped give them ownership to the rules and set clear standards expected of them when operating their device. Although time consuming, having the students repeat many of the basic steps, such as entering their user name and password to log on, ensured that all had grasped the essential tasks. Many also needed extensive keyboard practice to improve their touch typing skills. The teacher felt that without wireless ‘the temptation to get online is not there and the focus is on efficient use of the device itself. Once the wireless is connected, the children should have a good understanding and grasp of the device and be able to operate in conjunction with the programs we have worked on. Then any further progress or introduction to new programs will be a little easier’.

The school has considerable space as it was built to cater for 1200 students. The class was therefore located in a double room, enabling a set up where students could operate in three zones: traditional, with rows of desks, a lounge area, with a sofa and floor space, and a peer group area with larger tables, where groups of children with their individual laptops could work together.
The need for ‘different room architecture’ was cited by the teacher and principal as necessary when integrating 1:1 eLearning into the classroom. Students in the ‘traditional’ section of the room were seated in rows to accommodate the data projector in the middle and so that they can face the screen.

When teaching new skills or processes, the teacher would model the new tasks first. Programs such as Typefast were used where needed. Games such as Number Bingo introduced the students to the use of Excel. Spelling was still done in handwritten form as the spell check was confusing for the students. Handwriting would, according to the teacher, remain a priority.

Early in the Project, a Virtual Classroom space was set up on the Department of Education Learning Place site, but the classroom initially only had a small number of blue cables that needed to be shared. Connecting via cable typically meant a ten minute wait for the devices to load. In this early phase, because of the time to get devices started and the students working, the assistance of the practicum student, who was in the classroom during this early phase, was considered most beneficial.

The classroom teacher needed to spend much of his own time ensuring all equipment was working safely, for example installing electrical power boards for charging. The principal noted that a 12-month lead-in time is required for professional development, resolution of network issues and development of digital pedagogy.

**Management Strategies and Rules in the 1:1 Classroom**

The basic introduction to the device involved rules on looking after it, keeping their password to themselves and not using other people’s device. Procedures included, for example, collecting and returning the laptops in small groups to avoid potential accidents and hazards that may occur if the whole class was to go at once. Each of these rules and procedures was explained and elaborated with the students as they were created. Many were written up around the room.

**Initial Impact on the Students**

Only a few weeks after the introduction of the computers, the teacher was seeing marked differences in the student attitudes and learning in his class. Overall there was increased engagement, productivity and collaboration. Students with specific behavioural or learning difficulties showed particularly strong improvement. One, for example, who was bright but a very poor hand writer, had gained a lot more confidence now that she could produce work that was attractive. Another, with severe behavioural difficulties was now focusing on his work and contributing to the class. Student attendance had also improved.

The students were ‘excited about what they could do to their screens and how they could have ownership of the device by setting it up how they wanted it’. The teacher also noted that the more the students used the device the more confident they became: ‘they have all improved greatly from the beginning and with further intensive basics training, they should be well ready for some detailed learning experiences come Term Two’.

The teacher’s written reflections during this period highlighted that ‘progress of the trial is being seriously halted by the unavailability of wireless networking but with what we have, the children are showing great interest in the program, they are engaged and are approaching all tasks with a great attitude’. These changes that he was seeing in his students in the early stages of implementation gave him confidence in the potential of the 1:1 eLearning environment once the systems and processes were in place and the wireless connectivity was available.

**Initial Parent Support and Liaison**

A Parent session was held to inform the parents about the project and the expectations when students started taking the devices home. They were generally very supportive of the 1:1 eLearning Project although some remained hesitant about the devices coming home, mainly for
insurance reasons. Parents were to pay $20 a term for the device. Insurance for loss was calculated at $200, but if charged at all it would be done pro rata.

Being able to fit the laptop into the student’s school bag was considered important in reducing theft, damage and loss when the students started taking it home. Heavy plastic zip bags were purchased to place the computers in order to protect it from food and drink in the bag. The principal considered that if the student did not wish to take his computer home (or his parents were concerned about him doing so) he could use a memory stick to transfer files to a PC at home. Those who also have access to the internet at home would be able to connect to the Virtual Classroom to access their work. The Virtual Classroom would also have a ‘Parent’ tab so that communication between parents and the school could occur digitally.

4.4.3 Progress

Hardware and Connectivity

Although the teacher continued to use the computers in the classroom as much as possible, a range of hardware and infrastructure issues hindered the implementation of an effective 1:1 classroom for the first three terms of the year. By mid year over 30% of the computers had been taken interstate for repair. The Department of Education provided ten extra devices to cover times without them.

Wireless connectivity was installed early in term 3, but it took a further 3 weeks to ‘iron out the bugs’ and the teacher needed to individually reset passwords and check that each laptop would connect. Although the wireless was sorted, technology issues continued to frustrate the effective use of the devices. They were very slow to open, even though most of the files stored on individual devices were mainly Word documents, the biggest file being Photo Story. There also appeared to be no consistency in connection. At different times of the day, in similar or different parts of the room, some devices would not connect to the wireless, even if they had from that same place earlier in the day.

The differences in hardware on the devices and on the teacher laptop were revealed as a further issue when the students were unable to present their Pirate Photo Stories, the products of a major project, to the class. This activity was designed to generate reflection and discussion on each group work. The teacher noted that ‘the children, whilst knowing they had worked hard and created something special, were left feeling disappointed and let down by the technology…To be able to have a celebration of achievement would have been a good culmination [of the project] for them’.

The various technical problems were identified and addressed by mid Term 4. In the meantime the teacher had continued to put in long hours to ‘get through the set up processes required and assist students to participate in the learning. His efforts were instrumental in the resulting very positive learning outcomes for the students.

Both the principal and the classroom teacher expressed the hope that the 1:1 eLearning project would continue for another year as they expected, by the end of 2009, to have achieved 50–75% of what they had thought would be achieved in 2008. They felt that the project should, in reality, have been a 3-year project, with the first 18 months spent exploring and correcting the technical issues.

4.4.4 Impact on Teaching and Learning

Using Technology in the Classroom

With the introduction of the 1:1 classroom, the teacher continued to participate in the weekly curriculum planning sessions with his year level colleagues. However, this would be followed with a session with the Principal in which they would discuss how this curriculum would be
adopted in the 1:1 learning environment. The teacher was also exposed to a range of related professional development activities over the year.

The teacher highlighted the changes to his teaching practice that were occurring in the 1:1 environment over the year. Previously he was always at the blackboard ‘me and chalk and talk stuff’. Now the blackboard was not used, classroom activities were less teacher-directed and, when teaching directly, he now sits in the middle of the room, at his laptop and next to the projector with students around him. He would typically start the morning running the students through the tasks and what was expected of them and would model the learning using a projector and interactive whiteboard before the students did the work on their own computers. If teaching a new concept, a sheet with instructions was not enough due to the students’ different reading levels and their tendency to be more visual learners. Sometimes he would have different students model the activity.

Students would then work in the different spaces around the classroom according to what they were doing. They decided who they would sit next to or work with on the day: ‘It is more relaxed for them they feel more comfortable’. The teacher’s expectations of what the students were capable of, could produce and could get involved in was ‘much higher’ now that he had seen them working on the device.

Activities previously undertaken on paper were transformed into computer based activities, which inspired enthusiasm and excitement in the students. Speed Number Facts (where students answer 20 number facts and each is given the time it took to finish them) changed from paper based to being completed on the devices. Using excel, they numbered 1-20 down the page. The number facts were put on the board and students worked through them, recording their answers in the corresponding cell. Once all the children had completed the number facts, the answers were discussed, with students marking their own by filling the cells with ‘yellow’ if correct or red if not. The students had usually enjoyed this activity when it was done in their books but, once introduced on their devices, they moved to new level of enthusiasm, and were able to complete the task faster. One student, who rarely completed her 20 Number Facts in the 10 minute time period, finished her first attempt on her device in 7 minutes.

Similarly, when their regular spelling and sentence writing tasks were transferred to the devices, two students, who have trouble with their writing and are typically slow were able to work much faster than usual by typing their work. The teacher felt this was possibly because they found the keyboard easier than the pencil but also ‘the excitement of working on the computers lifted the level of concentration and work in some students’.

The teacher also changed his practice to address some of the issues that arose as learning tasks moved to the devices. The following example was noted in his journal:

‘Editing the children’s work was extremely hard. With pen and paper it is easy to work through a child’s work with a red pen and fix things here and there. On the computer however, it was very tough. I found myself having to take control of their device and fix their errors. By doing this it didn’t allow the children to see where they had made mistakes. The overall conferencing time was much longer than paper/pencil work. A valuable lesson was learnt here - At this point in time, the children should stick to ‘first draft’ writing on paper so that editing process can be quicker and also be able to show the children where they need to improve. Final drafts can be put onto the computers as a presentation of the work they have done’.

Access to the wireless provided the scope for a range of new activities. Prior to wireless access, Learning Place activities were being completed jointly on the teacher’s computer or via a limited number of blue cables rather than on their individual devices. The teacher had noted the students’ eagerness to be doing this on their own devices ‘they cannot wait to be given access to these resources’.
Once internet access on their individual devices was possible, work in the Learning Place became more regular. Their Virtual Classroom was set up with help of a Department of Education mentor. Students were able to access the online Learning Objects and they worked on the available online learning units available. Opportunities to research information were opened up and through these activities the teacher was able to increase his focus on student centred, inquiry based learning.

The project work undertaken by the students provided opportunities to use a range of technologies in conjunction with their devices. A major project on Pirates, for example, involved the development of Photo Stories. They used digital cameras and added voice narration, through microphones, and light background music to their story. Each Photo story had timed transitions with different effects.

Once the students were able to connect to the wireless on their devices, the issue of ‘e-safety’ was covered with the class. This involved a class discussion about ‘what is out there in the real world and the dangers that can present themselves to people who are not cautious or sensible while working online’ As a class, they came up with a series of points to remember, including never giving out your personal details, staying in view of an adult when online and only going onto sites that are familiar to them.

When commenting on the classroom teacher, the principal indicated the changes in his teaching practice as he integrated 1:1 into his pedagogy. ‘A few months ago he would have been talking about the process [logon/search/find], but not now… he’s telling me about the output. The tool used was the computer, but he’s not telling me about the tool any more.’ He also described the learning in the class as ‘more fluid - not Maths followed by English, followed by ICT. A lot of the research says not all children are set up that way…not all teachers and principals are set up that way!’

A key message that was impressed on the teacher by the Principal was the need to always think of what the goal is in using new technology and new software as it is ‘easy to be blinded and bogged down by the computer as a tool.’ Using Photo Story, for example should not be about making a photo story, but rather ‘it’s about developing a multimodal text that embeds spoken genres’.

**Impact on Student Learning**

As indicated in the examples above, better results were evident when students were involved in 1:1 eLearning. It allowed extension and support for poorer learners and, in particular, assisted those who were impeded in their learning because of poor fine motor skills. The principal picked up on this notable change in the students, highlighting the need for the national testing (NAPLAN) ‘to be digital’ as ‘some of the boys in the 1:1 class could produce four pages of writing, but wrote only three words on the test handwriting…neatness and the ‘brain keeping up’ were issues’.

He felt that the responses from students showed that the devices were ‘starting to sell themselves … the looks on the kids’ faces say it all’. He spoke of one student, who had previously been suspended four times, still working solidly at 2.20pm on a Friday afternoon. He believed 1:1 students were ‘ahead of the other kids’ in critical literacy as a result of the time they spent working online, looking at issues such as copyright, different writing styles and different points of view.

According to the teacher, the students’ enjoyment and engagement in working on their devices (online and offline) meant behaviour management had become less of an issue, particularly as the threat of removing them was a disincentive for difficult behaviour. The devices also initially had a notably positive affect on attendance although, as the project has continued, attendance rates dropped back to previous levels.
In regard to specific learning, he noted the capacity of the students in using the Excel for graphing and statistics: ‘Considering their age, the children are very efficient users of excel and they were able to do this activity with ease. I did this same activity for the first time in university and with assistance, so for these children to do this activity with such ease and success is amazing’. He gave the example of one student with literacy issues who showed strong proficiency in producing graphs in Excel whereas ‘she would not have been able to create these in her book’.

Once reliable Internet access was available, the teacher felt that more individualised learning was possible. The Learning Place, for example, provided literacy and numeracy tasks that students could access at their level. He also noted the increased student collaboration and support that working on their computers had generated. Mentoring between students increased notably when the teacher introduced the rule that they should ask three students for help before approaching him with a question. This was also seen as a more effective approach as ‘children can explain it in a much more broken down way…. It is better to communicate child to child as it is easier for them to understand’.

The student teamwork was also resulting in high quality and creative work. The group development of Photo Stories for the Pirate project was detailed by the teacher in his journal: ‘Knowing what lay ahead of them as far as dressing up and creating pirate scenes, the children have approached the planning really well. Most times, planning is something children don’t really care for because it can be arduous. The children approached this planning with an attitude of getting the job done but also one of concentration as they wanted to make sure they were doing it properly’. The Photo Stories were built in stages, as students learnt about and added aspects such as narration and music. ‘The children really got into the whole process of making their Photo Stories. They helped each other and were patient while waiting to use the one microphone available or for help from each other or the teacher. They enthusiastically, worked through the lunch hour to finish, ‘enjoying sharing their finished product with each other’. He added that ‘For the amount of time the children had to create their Photo Stories, they have created finished products that are of an exceptional standard for their age’.

Although the full use of the computers was not possible till the last few weeks of the year and, despite the frustrations that this had created, the teacher remained extremely positive about the implementation of the devices, which, along with significant changes to his teaching practice and classroom environment, had transformed learning processes and outcomes in the classroom. His comments following his work with excel, show his excitement in taking this further in the future: ‘I can not believe what these machines are bringing out of the children. I feel that the concept of graphing and statistics has well and truly been grasped by the majority of this class easily. I just hope I can keep finding ways to integrate other concepts from all areas and see if they can be grasped and developed as well as what this one has’.

By the end of the year the students, too, were now ‘over the moon’ that finally they could access the internet in a new and exciting way. ‘Even though it is only the beginning stages of this part of their learning, they are now beginning to see how different learning can be and that conventional learning can be replaced by other methods that are not so restrictive’.

**Home and School Links**

The computers commenced going home in the final term. They were taking them home every night in the last four weeks of term to make up for the delays that had occurred over the year. It was also important as parents had paid for the insurance but ‘had not got their money’s worth out of the program’.

Rules for taking them home were established with the students, the main ones being that the must bring it back every day and they must shut down when there is only 20% battery left so that
enough power to use it first thing in the morning while on the charger. Cyber safety discussions had also taken place in preparation for taking the devices home with rules established around using computer in front of their parents, staying out of sites they did not know and no downloading or playing games or music.

Students were given homework that consolidated what they had done during the day. They were enthusiastic about the home use, resulting in parents asking if student could have more homework as they were finishing what they were given so quickly.

4.4.5 Future Plans

The devices will remain with the teacher in his new class next year. He is looking forward to what he can do from the start of next year given that the devices are now working well and everything’ including the Learning Place’ is set up ready to go. He also has far greater confidence as he has understands what can be done and has new ideas to introduce in the future.

Students were, towards the end of the year using the devices 30-50% of the time. Next year he aims for at least 50%. He predicts that the students next year would reach the level his current class is now at by mid year. He would commence implementing computer based and online activities where appropriate, particularly through the use of many of the Learning Objects. At the same time he would continue to ensure that handwriting is not neglected.

The Principal considers the selection of the teacher is key. They need to be ‘positive, tenacious and tolerant’ in the face of numerous obstacles, as well as remaining ‘open to new ideas’ and ‘able to bounce back from failure and disasters’. They should also have good humour and not be ‘a whinger’. He saw the 1:1 teacher taking on a mentor role for other teachers in the school next year, in preparation for a more widespread implementation of 1:1 across the school in the future. He had no doubts about their pedagogy, willingness or capability of maintaining and expanding the 1:1 eLearning environment at his school. Rather, he is concerned about the serviceability of the devices, who would pay for them and the training for teachers using them. He had provided an unsustainable amount of professional development for the teacher this year $6–7000 out of a whole-school budget of $100k.

The pressure from parents also needs to be taken into account. If they had paid a significant amount they would ‘expect to see significant change from day 1’. For this reason the parents in the school had not been asked to outlay any money in the initial stage (although a small amount was paid as insurance in the latter part of the year). This has allowed time for a more gradual introduction without unrealistic expectations on the teacher. Time could be spent developing the necessary first stage skills and capacity e.g. basic skills such as keyboarding for students and providing teacher professional development. It also allows time to reflect on what is happening and how to improve it or streamline it to suit the school.

Drawing on his experience with 1:1 eLearning, both in this school and a prior school, the Principal also stressed the importance of the School Leader’s role and the need for them to be ‘right in there…as they are responsible for curriculum implementation.’ They should ‘go in with their eyes open, aware that you need to move slowly, support the teacher/s involved and be prepared to devote time to getting it right’.

The community of practice for schools with 1:1 programs was considered a very positive step in providing the level of support needed. This was being set up in the State to provide a forum where teachers and leaders can talk about the devices, the technology and the pedagogy.
4.5 School E

4.5.1 The School Context and Approach

School E is located in an outer suburban area. The 327 students are drawn from a wide area with a very diverse population, including around 45% of families with a non English speaking background and 40% from low socio economic backgrounds. In addition to its regular classrooms there are also some Montessori classes in the lower levels.

Teaching and Learning Approach

The School aims to develop students who are ‘active thinkers’ through the use of digital technologies and inquiry driven, project based learning. The demographic of the school population has generated the need for a strong focus on individual learning paths for students, coupled with collaborative learning and an opportunity to ‘learn how to play’.

A great deal has been spent, over many years, on professional development that equips the teachers to explore and use innovative technologies in the effective implementation of inquiry based teaching and learning. Staff have, for example undertaken the Intel Teach Essentials Course. Updating this knowledge is encouraged, resulting in overseas study trips by several staff to view classrooms and schools using innovative technology and teaching practices. The use of technology has also extended to include international collaborative learning projects with children in the UK, Singapore, Hong Kong and New Zealand.

Acknowledging that flexibility is needed, individual teachers are given the scope to decide how the technology is used in their classroom. With almost all school activities involving technology, teachers who have no interest in embedding ICT in teaching and learning are discouraged from applying for positions at the school.

The Focus on Technology

The very strong focus at the school on using technology in education has been driven by the Principal. Almost all school activities involve technology, all staff have laptop computers and staff communication is conducted online. The school has become part of a network of schools deeply involved in exploring and trialing innovative technology based approaches to teaching and learning.

The provision of high end technology at the school is ongoing. There is a well equipped Computer Centre, and all regular classrooms have interactive whiteboards, digital projectors and sound systems. The robotics program is a feature of the school and the Art room has had five computers installed, which will enable expansion of the multi-media programs and allow film-making, animation and advanced graphic to be taught.

Technical support is provided through a full time technician paid by the school as well as one day a week from the technician provided from the Department of Education pool. There has also been an ongoing partnership with a technology company, established to set up an Online Collaboration learning environment in the school.

Rationale for Involvement

The school’s very strong focus on using technology in education, their extensive research into the area in both Australia and overseas and their involvement in a network of schools that has been exploring and sharing innovative technology in education practices, led to their involvement in the 1:1 eLearning Project.

1:1 eLearning classrooms were seen as a way to improve individualised learning, leading the school to explore and trial a range of options in regard to the most appropriate devices. The device offered for this project was highly regarded due to its robustness, size, capacity for a range
of software and the option to add memory if required, further influencing their decision to become involved.

**Nature of the Involvement**

The devices were implemented in two Year 5/6 classes and one year 3/4 class, although only one 5/6 class with 27 students was studied. The teacher involved in the study was new to the school. In addition to his classroom teaching role, he was appointed as part of the leadership team, with the specific responsibility for the ICT coordination across the school. He is well trained in and knowledgeable about the effective use of technology in the classroom generally and, more specifically, the implementation of 1:1 eLearning in the classroom.

**Expectations for the Project**

The project, endorsed by the School Council, was seen as an opportunity to create a 1:1 classroom environment which maximises student achievement and facilitates digital literacies for students. The learnings from this project would provide them with increased understanding of what was needed and what was possible in a one to one environment. The 1:1 classrooms were also seen as a way to free up the computer laboratory and increase access for the other classes. Ultimately the teacher hoped to generate effective, collaborative 1:1 eLearning across and beyond the classroom.

**4.5.2 Introduction of the 1:1 Devices**

**The Establishment Phase**

The devices were in full use in the classroom by the end of Term 1. This followed some delays created by the lengthy time required to set up the devices and the installation of a further wireless access point. The school had also increased the memory on the hard drive of each device.

They were soon being used for most aspects of class life including word processing, internet searches, online collaboration, and the production and presentation of work. They were loaded with the Office Suite, Adobe Photoshop, Audacity, Groove, Photostory and music software.

All students in the class had individual learning plans and ePortfolios. The implementation of individual computers was seen as a way to increase the effectiveness of this individualised approach. Groove had been used to set up virtual spaces for each student.

1:1 eLearning was enhancing the project based learning approach used in the classroom. This was evident in, for example, a project on Space in which students chose to produce and present their work in a range of ways, such as posters, brochures, web pages, movies and podcasts.

The students were also taking their devices to specialist classes, such as English as a Second Language classes (ESL) and Music. ESL students were able to write stories and then use them to transfer and substitute words, change contexts and read and discuss the stories with others in the class. Other teachers in the school were very interested, keen to bring their class across so that their students could see them being used, and students were regularly inviting ‘buddies’ into the classroom.

The classroom work over the day also continued to include some non-technology activities that the teacher felt needed ongoing development. This included Reading Groups and handwriting activities with pen and paper, although sometimes students would write the information and then copy it across to their device.

**Management Strategies and Rules in the 1:1 Classroom**

The classroom arrangement had not changed with the introduction of the devices. Tables and chairs were in groups around the edge of the room with a large floor space at the front of the class. The classroom had an adjoining smaller room used for storage and other activities. Once
the students were working they were ‘free to sit anywhere around the room …within reason.’ Sometimes the students would choose the adjoining room especially if they needed to charge their devices. The extensive wireless networking throughout the school extended the flexibility and scope of the teaching and learning space, enabling students to take their devices to other classrooms and areas around the school.

Day to day procedures related to the devices were established early and the students soon automatically adhered to these routines. This involved placing the computer in the under desk storage at lunchtime, storing them in the lockable cupboard in the adjoining room at the end of the day and charging the computers as required (which had initially been a problem as it created a power overload resulting in ‘brown outs’). ‘Netiquette’ issues were discussed with students from the beginning of the project. Appropriate use, time of use and rules around contact with each other’s machines were emphasised.

**Initial Impact on Students**

In the early implementation phase, the teacher felt that the impact on student learning was already very noticeable: ‘All heads are down – all are engaged in learning’. Even the student with severe behaviour problems, who had an Integration Aide to assist him with his work, had shown improvement in his ability to remain focused and undertake the required tasks.

Whilst acknowledging that it was often hard to monitor what was happening on the computers and also that there was a need for the ‘Silence’ software to be installed so that the teacher could ‘halt’ students when needed, the teacher was confident that the students were so enthusiastic and proud to have the devices they were most unlikely to abuse the privilege.

**Initial Parent Support and Liaison**

The parents were informed of the imminent 1:1 project over several months, through newsletters and meetings. Those directly involved were very positive, their main concern relating to the impact on future use of pen and paper. They were made aware that, if there was evidence of carelessness or abuse of the computer, any damage would need to be covered. The school was, however, aware that with high unemployment in the parent community, any costs incurred needed to be dealt with sensitively.

It was planned that the devices would be taken home when the students had had more preparation and time on the computers and when there has been further exploration of the options for filtering site access.

**4.5.3 Progress**

**Hardware and Connectivity**

By early in Term 3, desks in the classroom were arranged in a U-shape to allow access to power boards and power points. All of the devices were running off the power, with students preferring to plug their computers in as the ‘the batteries don’t last long.’ This resulted in numerous power cords around the desks. During recess and lunchtime the devices were placed out of sight in tubs or on chairs but continued to run off the power to recharge. Very little work was stored on the device as students had their own storage space on the school server.

Over time, the ongoing technical support needed for the devices had, according to the Principal, doubled the workload and cost of the school technician. The introduction of a new server also meant that wireless settings were dropping out, requiring the teacher to individually fix each machine. The device was also considered slow. By the end of Term 3, half of those in the room had needed repair but the company with which the school had the maintenance contract had gone into receivership, creating some uncertainty regarding the next move. Difficulties with the devices and the delays in getting them repaired extended well into the final Term.
The teacher commented that ‘hiccups along the way’ had significantly added to his workload. He predicted that the technical problems encountered would be problematic and may multiply for teachers who did not have as much ICT background. When asked at the end of the year about the importance of a teacher’s technical skills, he replied ‘I think we’ve been in the luxurious position that I’ve got a technical background. If they didn’t have me there would probably be bigger issues.’

4.5.4 Impact on Teaching and Learning

Using Technology in the Classroom

Over the second half of the year, the devices were being used, on average, 50%–60% of the day. The teacher commented that they were ‘doing anything and everything’ with the devices, but that Maths was an area where they were used the least. According to the principal, this usage was not as high as initially intended, noting it was the result of both the technical difficulties and other issues including, for example, a planned online project with a Singapore school that was delayed.

The teacher felt that 1:1 eLearning had freed up the learning in his classroom. Research is easier and there was no need to plan ahead for use of the computer laboratory. The classroom was well equipped with a range of digital equipment and software, which are used in conjunction with the devices. The atmosphere was more spontaneous, and the classroom ‘pleasantly messy’.

His capacity to broadcast to the students’ machines was considered important ‘because you have to monitor what they’re doing … in reality they’re not always on task.’ The instant messaging facility (Microsoft Groove) allowed far greater access to the teacher. ‘It’s brought out conversations we would never have with kids otherwise.’ Instant access also meant the teacher could spend less time in direct whole-class teaching. ‘I [interrupt] their work for a much shorter time, rather than coming out and talking’. It had also drawn out ‘interesting reactions between students…some you don’t want, but some you want to encourage more.’ He also noted that the class use of instant messaging ‘ties me to the seat a bit’ as he was regularly responding quickly to students electronically.

Most literacy tasks were performed on OneNote and marked online. Other work was ‘grooved over’ from student to teacher or USBs were used to transfer work. Some students still chose to use books, pens and paper for specific tasks as ‘they are learning that it’s sometimes easier and quicker.’ In some cases, such as Maths, the teacher considered that this was a skill set issue, where the student does not yet have the skills to perform the tasks on the computer.

Activities undertaken using the devices were frequent and varied, often based within teacher-directed investigation projects. During one observation of the class, for example, the teacher used the ceiling-mounted digital projector with his laptop to demonstrate the next literacy project, a two part activity with an Olympic Games theme that would be worked on throughout the day. Firstly, the students were required to prepare the biography of an Australian athlete of their choosing. This involved research on their computers and a finished product, produced on paper to avoid paper wastage. ‘We’re very aware that a lot of paper gets wasted. So we rarely have to print’. The second activity involved the production of a ‘hero message’. Students were to use the Bigpond Olympic website for research and ‘Groove’ their individual message to the teacher. The form of the final message(s) to be sent was yet to be decided. They also worked on Grand Prix–themed team projects which involved the use of PowerPoint with images, text, a soundtrack and the design and creation of a logo. This was developed with the school IT consultant. Online collaboration activities included opportunities to engage in a ‘Skype session’ with another school, using video iMing.

In a music specialist class, the device was used to recreate songs using the ‘Too Simple’ program. This was demonstrated by the teacher (written on the board, sung by the teacher, sung together and the pattern of notes discussed). Some students found the exercise very challenging.
and some chose to recreate the musical phrase on xylophones ‘because ‘it’s easier’ and ‘quicker’.

In Art, students produced major portfolio pieces, researching an artist’s style and producing a piece based on it.

Students published their work in a variety of ways, sometimes with handwritten drafts, sometimes with all drafts produced electronically. However, all work for printing was sent to the teacher as there were no student printers in the school.

When asked about the changes to teaching and learning in a 1:1 classroom, the teacher replied: ‘It’s just so easy to do things. With a pod [of computers] you have to get through four and a half cycles of students’. In particular the devices provided more scope to do research activities both planned and spontaneous. ‘You don’t have to wait till you get to the library or when you go home’. The teacher also saw a major change in the time it took for students to complete tasks. As an example, he cited the two hours it took to produce work for a graduation book, whereas in the past ‘it would have taken a couple of weeks’ using the laboratory or computer pod.

However, at the end of the year he also reflected on the fact that they had not done as much online work or collaboration with outside groups as initially expected. Nor had they done a lot of work where the entire project was set up as a webpage or a virtual space. The curriculum, he considered, had not changed significantly with the introduction of the devices. It was ‘similar, but with another tool’. In terms of his teaching, he felt it was ‘still very content driven.’ Given the constraints of the project in its first year, he felt that he had not done ‘a lot of 21st century teaching.’

He recognised that the 1:1 environment hadn’t really changed the way he planned lessons and felt the next stage would be to adapt his ‘teaching to the technology’. He could see the need for more open ended learning for his students, where they chose the topic and the way they produced and presented their learnings’.

Impact on Student Learning

Most of the students were experienced technology users and most had more than one computer at home. Half the class has home broadband access and 75% had MSN at home and were messaging each other at night. Nonetheless, according to the teacher, the introduction of devices highlighted unexpected deficiencies in the students’ abilities as well as some surprising capabilities.

For a student who had ‘a lot of behavioural and social issues and speech and developmental problems’, 1:1 eLearning had proved particularly successful. His literacy skills were considered poor, evident in the NAPLAN writing test where he managed a line and a half in a 40-minute writing test. But with the device, his capacity to complete similar tasks increased substantially: ‘it was a very different story, opening up a very different world to him’. The improvement in the ESL students in the class, who were using English language software, was also particularly high.

The teacher highlighted the significant difference the devices had made in the collaboration and interaction between the students, describing it as ‘almost unbelievable’. He noted the increased ‘hum of productive noise’. He also felt it had improved their metacognitive insight into their own learning and abilities. Much of the improvement he was seeing in his students was, he believed, attributable to the fact that ‘when it’s their machine they take responsibility.’ He also noted that over the year, the students had became more discerning in regard to when they wanted to use their devices, making choices about the most appropriate tools to produce and present their work.

Students, while acknowledging some of the shortcomings of the devices, such as their ‘slowness in opening’, were very positive about 1:1 eLearning. They appreciated the fact that the computer was theirs: ‘In the morning when we come here, you can just go get your computer and turn it on and then it’s yours to use for the rest of the day. And no-one else can tell you to get off at all.’ It had helped them to be more independent, it was more flexible in how they went about their
learning, it had enabled them to ‘get a lot more work done’, and ‘learning was more interesting and fun’. It also provided them with opportunities to collaborate and assist each other with work.

Comparing their learning before and after the introduction of the devices, one student commented that previously she had to ask the teacher for answers whereas ‘now we can look it up’. The capacity to message was noted frequently. It was seen as way to ‘ask others for help as well as talk to your friends and have fun, once you’ve done your work’. They also appreciated the messaging contact they had with the teacher and being able to receive files that were sent by the teacher.

They noted that the teacher was able to lock the screens when in use and ‘take control’ although ‘sometimes it’s annoying’. One student felt they had more projects to do but could ‘always get into it… it’s better than homework’. Another considered that, with the devices, ‘basically you can learn anything…It makes learning more fun’. Looking to the year ahead, a student raised the prospect that ‘when we go to High School, we won’t have the same technology…then it would be harder for us’. However, she also thought that you could ‘learn just as much’ without a computer.

**Home and School Links**

The devices were not taken home over the year, mainly due to software licensing issues. It is, however, planned for next year as the teacher sees considerable benefits for students in having 24 hour access to the learning environment and also to the teacher (which he was comfortable with). He felt this was particularly important in a low socio economic area as it provided ‘a whole new range of access to the students’. In contrast, the response from quite a few of the students and parents was, ‘Why do we need another computer at home?’

**Changes in Leadership**

At the end of Term 3, the Principal left the school and a replacement Principal took on the role till the end of the year. When asked about the importance of the school leadership to the success of 1:1 eLearning, the teacher emphasised ‘Essential…because probably 98–99% of principals and teachers haven’t heard of [1:1 devices]’. There is a lack of understanding: ‘You have to have good leadership that has the ability to either fund it or can work their way around the funding of the project. If you haven’t got leadership that’s going to be supportive of it…supporting the programs, supporting the professional development of the teachers…bringing in other people to train your teachers up, whatever it might be, I think the project is going to run its course very quickly.’

However, when asked how important it was for his school’s new principal to have some kind of ICT knowledge and experience, the teacher commented: ‘I think it would be a huge bonus but having said that, I don’t think it’s 100% essential …with my position as leading teacher, I can still drive the program. However, he added that he could only drive it to a point. He also acknowledged the strong support that had been received from School Council.

**4.5.5 Future Plans**

The school plans to significantly expand 1:1 eLearning, rolling it out across years 4/5/6 in 2009, with possible further expansion to follow. They have asked the parents to buy the devices, which the students will take with them (stripped of all applications for licensing reasons) when they leave the school. The existing devices and computers will act as back-ups and extras for those families who are unable to afford them. The 1:1 teacher is now leading the process, as the Principal has recently retired from the school.
4.6 School F

4.6.1 The School Context and Approach

School 6 is located in an Outer Northern suburb of Melbourne. Its 200+ students are drawn from a very high proportion of low socio-economic families, many of whom do not view education as important. Significantly difficult and disruptive home environments are common. In addition, although there are not high numbers of recently arrived non English speaking families, some students from these families are sometimes severely traumatised by their experiences prior to arriving in Australia. Working with the students and their families can be very challenging for the teachers and, as a consequence, there is regular turnover of staff and often it is difficult to enlist new teachers.

Teaching and Learning Approach

The school is, along with School 5, one of the network schools that work together exploring and trialing innovative technology based approaches to teaching and learning.

The demographic of the school population has resulted in the need for a strong focus on individual learning paths for students, coupled with collaborative learning and an opportunity to ‘learn how to play’. Project based learning in a collaborative model is therefore central, with significant online learning opportunities and the withdrawal of students for specific individual assistance. ‘Learning conversations’ take place between student and teacher to develop implement and monitor the student’s Individual Learning Plan. In consultation with the teacher, students identify their goals and set plans to achieve and assess them. They are encouraged to become responsible for their own learning by regularly self assessing their learning path.

The focus on using technology and the new approach to teaching and learning has placed new pressures on some staff, who find it difficult to make the changes. Sustaining these changes across the school is therefore seen as a challenging.

The Focus on Technology

Technology underpins almost all of the school activities. Their aim is to ‘provide a quality learning environment’ where their students are able to ‘communicate effectively and obtain and use information. Integrating learning technologies as a routine teaching and learning tool across the curriculum provides this environment and is regarded as a way to ensure all students have equal opportunity to achieve success in a supportive, innovative, highly resourced, learning environment. It increases the development of communication skills and regular access to quality information and learning materials available on the internet, software applications, CD Rom and online data bases.

The school is well equipped with ‘state of the art’ wireless and server infrastructure. All teachers have remote access to the file server and all classrooms have the resources, which according to their website creates ‘a stimulating learning environment where children's work is valued and shared’. Students have a secure workspace and ‘Groove’ accounts have been set up for online collaboration.

Technical support is provided through a full time technician, paid by the school, as well as one day a week from the technician provided from their Department of Education pool. An ICT Consultant is also engaged to support the development and use of technology in the school.

Ongoing support for and training of teachers in the effective use of technology is also a priority. This has involved setting up opportunities for modelling and mentoring the effective use of technology and sharing best practice. The teachers involved in the 1:1 Project, although proficient in the use of technology, had had no specific training on 1:1 eLearning. In addition, during the previous two years the whole school (teachers and students) went through a
technology skill development program of one hour per week. Initially 10 technically proficient
students had been chosen to implement a ‘train the trainer’ model with other students but the
school found this did not work well. Instead, the ICT coordinator (the 1:1 eLearning teacher)
taught basic IT skills in a range of applications such as movie maker and how to use a scanner.
The students were then relied on to teach and support new students or students needing more
assistance.

**Rationale for Involvement**

The school has had a strong interest in 1:1 eLearning, seeing it as a way to address their focus on
individual learning paths and collaborative learning. This led them to explore a range of options.
They found PDAs to be too limiting as they only allowed for ‘cut’ down versions of the
Microsoft programs. Other laptops were also trialed in the school, but the device available for
this project was considered a better option because of its robustness and capacity. It was regarded
as particularly suitable for students around Years 3 and 4 or lower, but not necessarily adequate
enough for upper level students.

**Nature of the Involvement**

The 60 devices purchased by the school were allocated across the range of classes, although half
went to the Year 3/4 class. This class consisted of 63 students and three teachers who managed
the class across two large classrooms. There was also a teacher aide, bringing the adult to student
ratio in the class to around 1:15. One classroom was referred to as the ‘Action Learning Zone’,
where project work was conducted, while the other was for individual and small group work,
individual learning plan conversations and specific teaching. This new restructure of the learning
environment was designed to better accommodate their approach to teaching and learning. Each
level team in the school had a leader who acts as coach, modelling the teaching/learning practice,
and setting up the learning projects. The leading teacher at this level was also the school ICT
coordinator. Her work was the main study focus of this study.

Initially, the allocation of computers to specific students was not instigated as this was dependent
on ongoing council discussions and decisions around payment and ownership of the devices and
therefore who would be able to take them home. There were insufficient devices for one to one
ownership and, in addition, connection to the internet was particularly problematic, as not many
parents had internet connection and, at around $40 per month, it would be prohibitive for some
families.

**Expectations for the Project**

Their involvement in the 1:1 eLearning Project was seen by the school as an opportunity to
expand on their capacity to offer individualised learning programs and flexibility of learning
spaces, which were both key components of the new learning approach being introduced to their
students.

4.6.2 Introduction of the 1:1 Devices

**The Establishment Phase**

The computers were introduced during Term 1. Although there were not sufficient devices for
each student, there were 10 desktop computers and some whiteboards around the room that were
also available for student use as needed for their specific learning tasks. If students required
access to a computer they would choose between the devices and the desktop computers. The
teachers’ laptops were also made available for students to use. In addition to the computers the
students also had access to digital cameras, Digiblue technology, an interactive whiteboard, big
screen TVs, MP3 players and PDAs. The principal considered that the students needed
immediate access to a range of technologies. He also noted that ‘if we’re serious about ubiquitous
computing, these devices should be no different to any other tool that kids use. They should be just there, available.’

The students had daily activities and weekly tasks in the project room. They were largely self managing, with a spreadsheet on the classroom wall that acted as a tracking record, and were allowed to take control of what they did, within limits. Their work, for example, had to be to an acceptable level. In the second room, focused teaching took place individually, in small groups (ideally, no more than five or six, but always no more than eight) and in specialist classes such as music, art and science, which also occurred in small groups. The devices were being used across the range of activities and rooms.

The teacher found the devices very successful. Their portability meant that they could be used in a range of locations around the flexibly structured rooms. They were supporting the range of individual and group learning activities and the set up of individual work spaces on the network allowed easy tracking of individual student learning. Teachers referred to these work spaces in the one to one Learning Conversations with individual students, which occurred at least three times per week and could take up to an hour. The teacher described this new pedagogical approach as ‘structured freedom’. She regarded it very positively: ‘Its a great way to teach – I could not go back to the old way’.

Management Strategies and Rules in the 1:1 Classroom

According to the teacher ‘There’s nothing special set up. The kids choose if they want to go to the computers.’ There was also significant flexibility in where they did their work. The leading teacher did not have a desk, choosing instead to be constantly mobile, interacting with the students as they worked individually and in groups.

The project room was set up in groups of desks, with a hole in the middle through which cords lead to the power points underneath the desks. The second room was very open, with table groups, couches and plenty of floor space. Students would take the devices to the various group sessions but were not permitted to touch them while the teacher was teaching. When they were using them to work, they were also allowed to check their messages.

The Initial Impact on Students

Students were, according to the teacher, very trustworthy in their use of the devices – they considered it a privilege to use them and there had been no incidents of misuse. They were keen to be involved and very engaged in this new style of learning. It was noted by the Principal that absenteeism had dropped from 10 to 2 days, on average, since the new learning arrangements and the increased access to computers.

Initial Parent Support and Liaison

Many parents were interested in the introduction of the new computers, although the school was keen not to ‘make a fuss’ as they felt it should be regarded as ‘just part of what we do’. Although it was still being resolved devices computers during the day, only those who could afford to pay for them would be able to take them home.

4.6.3 Progress

Hardware and Connectivity

The device continued to be praised for its ‘light weight’, its ‘flexibility’ and its ‘sturdiness’. However, seven had been sent for repair by mid Term 3 and, as with School 5, the company with which the schools had the maintenance contract, had gone into receivership and there was some confusion as to the next step.

The devices were also taking a long time to start up which, according to the principal, the students found ‘a bit frustrating….If it’s a choice between the desktop computer and the [device],
the kids will go to the desktop every time’. He also noted that the students ‘preferred the
desktops for design work’ because the device screens ‘were considered too small’. He described
them, however, as ‘fantastic’ as a ‘take home device’, believing this to be their main value.

4.6.4 Impact on Teaching and Learning

Using Technology in the Classroom

The collaborative learning model and project-based pedagogies, specifically for use in combined
learning areas, were continuing to be implemented in line with the learning plans developed for
each student. Self-directed learning was evident. Some students were, for example, working on a
robotics project, undertaking the activities in the project room, in the science room and with the
school technical support person, and using the devices, the desktop computers or the laptops.
Students were also using the devices and other computers for their project work on the Olympic
Games, located in the ‘Olympic space’ established on the Groove workspace. The withdrawal of
small groups for specific teaching was also continuing, determined by the needs, levels and
learning styles of particular groups of students and made possible through the team teaching
model across the Years 3/4 class.

The teacher felt that the devices were ‘great for my teaching style …It’s taken three terms to get
to this point and it’s amazing.’ She had ‘always been pretty high-tech’ and tried to utilise
technology in her teaching whenever possible: ‘Every time something new comes out, I try and
incorporate it.’ Each term she aimed to ‘introduce her students to something new, technology-
wise, which fits in with their projects.’

But she also described herself as being ‘enriched by the knowledge and skills that the students
bring…the students peer teach, with teachers having to catch up’. The students’ ‘increased
engagement levels’ were evident. She believed that ‘the winner in all this’ had been the students
noting that this was dependent on the ‘risks’ the teacher took and the ‘good modelling, which
leads to good learners and good risk takers’. She considered the future to be ‘in the hands of the
teacher and that results would depend on how the teacher ‘responds to both the technology and
the challenge of student proficiency’.

The Principal was not interested in ‘1:1 per se…as [devices] don’t do it…The engagement takes
kids to one level, but when kids can be in workspaces of their choice, then we see true
collaboration [including] rolling online conversations, where children are typing rather than
speaking’.

The students favoured PowerPoint and Pivot in their various technology based activities, but a
wide range of software was being used, including Groove, Pivot, Digiblue camera software, Dino
microscope software, Google, Sketchup, Monkeyjam, Photostory and Audacity. They detailed
some of the work they were doing, which included the development of a photo album and a logo
using PowerPoint, using Pivot for stick figure animation about the Olympics, creating Robots
through the Robotics program, researching information for their projects and interacting with
people over the world through messaging.

The students regarded the portability of the devices to be their key feature. One student for
example preferred to use the device ‘because they’re small and we can move with them and not
just sit’ while another thought they were ‘convenient because we can carry them anywhere, they
are small and they’re perfect for children’.

However, by fourth term, the generally positive responses to the devices had reduced, at home
and in the classroom. The teacher commented: ‘…we had a kind of mixed response with the
[devices]. Some of the Grade 4s reverted to the desktop computers…because you can see the full
screen’. They had started using some ‘more high-tech technology’ (Scratch Software) on the
devices and the students found that ‘the screen wasn’t big enough’ and ‘they were not able to
control it’ as precisely. The teacher also commented that the students themselves had grown weary of how long the devices took to start up and the fact that ‘they would go into standby mode’.

Towards the end of the final term and before the final visit to the school, the use of the devices had been discontinued and had been cleaned of all data in preparation for selling them. The school was not planning to use them next year, instead, looking at alternate 1:1 devices.

**Impact on Student Learning**

Over the year, the teacher highlighted significant outcomes for most students, noting that they had ‘thrived’ in their new learning environment. She referred to the increased autonomy in their learning and the growing sophistication in their digital literacy, including their ability to skim read, synthesise and make judgments on the usefulness of web pages: ‘These are indirectly taught…they’re able to work out which web pages to go to and which ones won’t [be any good].’

Many students had progressed well, and this was showing in their assessment results, which the teacher commented were ‘through the roof…especially with the Grade 4s because of their maturity levels’. She also noted the perceived benefit of 1:1 eLearning on the more able Year 3 students. They were at the state average in the national assessment tests (an achievement considered ‘good for this area’): ‘The computers have certainly helped the top end kids with their reading skills. They’ve got [nothing] from me. I’d send them off to find out and they’d know, just from experience, what sites to click on – skim reading [the first paragraph] or [how to] digesting whether that page was worth reading.’ These ‘top end’ students had also learnt the ‘ctrl-f’ find function and successfully used it within web documents.

The centrality of the relationship between educator and student was reiterated when discussing this intrinsic learning of literacy and ICT skills. ‘It’s not till you talk to them…As a teacher, you wouldn’t know unless you were tuned into those learning behaviours and then watching them. You wouldn’t know that they were actually doing it unless you stood with them and watched them do it.

The teacher also recognised that the efficacy of 1:1 is hard to determine at this stage as its introduction co-existed alongside new pedagogy, new teaching styles, new arrangements of classrooms and new foci of student learning. ‘We can’t pinpoint exactly whether that good data is coming from the small focused teaching groups or the project room environment where they have access to the technology. I’m sure that they go hand-in-hand together. There’s no other way of seeing it’. She also added: ‘As a teacher, it’s my job to make sure that every student…has left my year with a progression. They would do that with or without a computer.’

The increased level of peer teaching was also a notable achievement, which the teacher felt added significantly and very positively to the dynamics of the classroom and the outcomes for students. ‘Why does all the teaching have to come from the teachers? [The students] are teaching each other. They’re teaching the teacher. They’re learning without realising they’re actually learning.’

However, the teacher also noted that the lower end Grade 3 students ‘had progressed, but not as much as hoped’. She described about 5% of the students as ‘unready’ both for project learning and 1:1 eLearning. ‘From a teaching point of view, those kids at the lower end…who struggle with reading, who struggle with all those basics aren’t ready for the [device], they’re not ready for project learning as such.’ The aim of the school, she believed, was to improve reading, writing and maths’. If technology isn’t used properly in the classroom, she felt it would not necessarily achieve this. She believed there was no place for 1:1 with students who could neither read nor write. These basics, as prerequisites to further learning were considered fundamental to the incorporation of individual devices in the classroom.

Instead, she felt these students needed consistent rote learning, with small focused teaching groups, away from noise. She indicated that this had not happened enough in her 3/4 classroom
in 2008, but that it would be happening in her classroom in 2009. ‘There’s no point in implementing the technology if those kids aren’t ready for it…the [device] wouldn’t be appropriate for those kids to use in the classroom…[they] shouldn’t have [it] because they seriously wouldn’t have the skills to know what to do with it. They have learning difficulties…As a teacher, what’s the purpose of giving a computer if they can’t read and write. What are they going to do on it?’ Such students, she felt, required explicit teaching about the subject, the method of delivery and they often have to be taught the applications also. Project based and self-directed learning are, according to the classroom teacher, dependent on the maturity levels of the students.

The teacher also noted the favourable response that students had to the use of books in the classroom. Their ‘real, tactile’ nature meant that many students seemed to prefer the use of books, particularly in comparison to small-screened and slow to start [device]. However, she also reflected on the fact that some students preferred the [devices] over the use of an Interactive TV screen or interactive whiteboards where it was often difficult to reach the top of the screen. ‘They’ve gone back to the device’, connected to the screen via the Internet, ‘they’re easier, what they are used to, or they’ve got control over it…it’s not as frustrating’.

Home and School Links

The ‘digital divide’ is, according to the principal, in part a result of the area’s socioeconomic background, and reflective of the parents’ education levels and aspirations. During ‘aspirational interviews’ parents expressed that ‘they wanted positive outcomes for their children but didn’t know how to go about it, to access information. They don’t understand the pathways.’

In Term 3, 25 of the 63 students were given the opportunity to take devices home. These students had been chosen on the basis that they had home broadband, were themselves or had parents who were enthusiastic about technology, or were thought to be likely to benefit from 1:1 eLearning. This was the first time the devices had been ‘assigned’ to individual students. In the early stages, students were very positive about taking the devices home. One student, for example, commented: ‘It’s kind of a little learning thing at home, so I can not only learn on it here, I can learn on it at home’.

The teacher commented that it had not been an easy process to choose the cohort of students. She also added that it had not been entirely successful. ‘We wanted to include kids who were going to get something out of it. And we’ve been disappointed by some of the students because they haven’t got as much out of it as we’d hoped…[they’re] just choosing not to use them and not taking them home. They seemed to be technologically able but when it came to that choice, they’d rather not do it. I don’t know why.’

Despite information being sent out and information evenings, there had not been much feedback or reaction from parents, although a small number, who were not included wanted their children to bring the devices home and one of the selected parents had asked if their child was supposed to be using the device at home, because they hadn’t been. This limited reaction was put down to the demographics of the school.

In the final week in which the devices were available, only five of the original 25 students were still taking the devices home. The others, according to the teacher ‘…just can’t be bothered with them’. There was a huge wave of everyone wanting one. But we’ve gone past that now. We don’t want something that is slow. We want something that’s faster; we want something that’s meeting our needs…They’re just not being used in the classroom’.

4.6.5 Future Plans

The 2009 plan for technology is to focus on Years 5 and 6, with the teacher from this year’s project involved as the leading teacher at this level. In particular, as ICT Coordinator, she will
run small withdrawal groups to teach specific skills and programs or computer projects. A teacher aide will also take out small withdrawal groups for focused learning and the additional two teachers for this cohort of 65 will manage the teaching and learning activities in the main room and an adjoining specialist science room. Although still at the planning stage, it is thought that students will sign up for the program they want, for example, Claymation or game design, or PowerPoint for new students and the Year 6 students who missed out on 2008’s ICT focus. These activities will be on a needs and wants basis.

The teacher felt that the 1:1 project had changed her ideas on how to work with ICT in the following year. By moving to Years 5 and 6 she will need to look for new technology possibilities as ‘this year’s Year 4s have done what I know’. She has asked for a USB to be on individual students’ booklists. She also sees her students ‘wanting to use technology a lot more, especially with homework’ and predicts that that homework would be digital, as most of the students have computers at home even though they may not have the internet. The new 1:1 devices ‘as we’ve been promised’ would increase the effectiveness of this approach.

Following on from the peer teaching evident in 2008, the plan for later in 2009 is for these Years 5 and 6 students ‘to take smaller groups from around the school and teach them IT skills’ She has already identified some of her Year 4 students who are ‘experts’.

Footnotes:
1. As detailed above, the school had not used the devices in an authentic 1:1 eLearning situation (where each student in the class had ownership of or was responsible for a specific device. As a result, whilst there were some interesting learnings for the school, and there are some learnings that relate to a student’s regular access to computers and the implications of this, we are unable to use this data to directly discuss the effectiveness of 1:1 eLearning.
2. It is also noted that the room had been packed down on the final visit, which did not allow for our observations of the interactive classroom, which meant that we were dependent upon the teacher’s data.

DISCUSSION

5 IMPACT OF THE 1:1 DEVICES ON TEACHING & LEARNING IN THE CLASSROOM

According to the participants in this study, there were multiple ways in which the introduction of the 1:1 devices impacted upon everyday classroom practices. The 1:1 classroom teachers highlighted four key ways in which these impacts could be observed. First, in one way or another and to varying degrees, the organisation of the physical learning space was altered. Secondly, the teachers noted the changes which occurred in the ways they interacted with their students. Thirdly they described how the ways in which they presented work to students had altered and would continue to change beyond this study. Finally, all sites of this study noted the dynamic shifts which had occurred within the ways that students worked and learned independently, as well as cooperatively.

5.1 The Physical Environment

At the beginning of this study there were two dominant ways in which the classrooms were organised for learning. The first of these is what we will refer to as a ‘traditional classroom’ organisation, whereby, the desks are organised to all face in the same direction. In this traditional space, the desks are usually organised towards the teacher, to ensure that students can effectively hear and see the instruction provided. This classroom is generally representative of transmissive pedagogies, where learning is more often directed by the teacher, and students demonstrate what they have learned through their correct response to a task. The second type of organisation evident within the sites will be referred to as a ‘cooperative classroom’. In the cooperative
classroom, students’ furniture is organised in a way which most effectively facilitates collaborative work amongst and between the students. Such an approach encourages cooperative and inquiry learning, which is more often student directed and positions the teacher in the role of guide, facilitator and often research expert.

In this pilot project, most of the teachers commenced with the same classroom organisation as they had had previously. One teacher, however, commenced with a complete reorganisation of the learning space, from a cooperative learning space to a traditional learning space. When asked why this had occurred, the teacher described a number of concerns she had about the introduction of the devices, which included the need to have all computer screens facing away from the light, with students facing the whitescreen so that she could teach them basic computer skills all at the same time and ensure they stayed on task. Floor space was also reduced. She noted that this arrangement restricted her ability to engage the students in more cooperative work such as Art and Science and was concerned that the students, having come from a more cooperative organisation previously, missed the chance to share their work with their peers. A change to a different classroom led to slightly expanded space, although a similar set up was retained to enable the teacher to work with the students as a group and be more aware of what they were doing on their devices.

Over the period of the study, all teachers modified their learning environments for a range of reasons. In the first instance, this was to ‘make the computers work better’. Keeping the devices charged, for example, required the set up of one or more charging areas within the classroom to avoid the potential hazard of long cords across the floors. Similarly, where wireless devices were not working, the students needed to move to an area where they could have access to an Ethernet connection. In one site, where the students required Internet access, they would work on a particular side of the classroom to ensure they had a strong enough signal from the router.

Some teachers felt frustrated by the ways in which these ‘practical requirements of having so many computers in the classroom’ impacted on their preferable classroom management strategies. This was compounded when devices were taken away for repair. One teacher described having to construct ‘an area of the classroom where desktop computers or alternate devices could be set up’ to enable all students to complete ICT based tasks. At one stage, when numerous devices were affected, the students needed to work in a ‘computer lab’ which was quite separate. The teacher remarked that this led to a ‘split’ amongst the students, requiring him to ‘manage two different groups’. At another school site, in the same circumstances, the students would be split amongst the ‘other classes who were not using all of the computers they had’.

Most teachers reorganised their classrooms to incorporate both traditional and cooperative classrooms. One teacher, for example, described how important it was for students to be able to choose to work with others, and decide who they work with, whilst also having the choice to work in ‘break-out spaces’. This teacher also stressed the importance of being able to address the whole group and gather them in a single space, both with and without the devices. In another site, the teacher had reorganised the space with an equal physical space for both direct instruction and independent and inquiry work. He described the ways in which he commenced the day with the whole group in one side of his classroom, to ‘plan the learning day ahead’. Once this initial briefing had occurred, the students selected the space and mode of work. Similarly, another teacher had the whole room set up in small clusters, where students could work cooperatively. She discovered that as the use of the devices became ‘more normal in the classroom’ the students would often work with the devices on the floor, or under desks. As long as they remained on task, this teacher was ‘happy for the students to work in whatever way suited them and move the furniture from day to day and lesson to lesson’. Accordingly, the teacher reserved the same right.

The notion of providing separate and more flexible working spaces, as described in these examples, was far more achievable in classrooms that were more spacious. One of the classes, for example, was located in a double classroom.
The extent to which the learning environment extended beyond the immediate classroom was limited in the majority of schools due to difficulties in achieving wireless connectivity. The short battery life of the devices further hindered potential flexibility. Many had anticipated that ‘anytime, anywhere’, learning would be a key feature of the 1:1 devices but were disappointed in the extent to which this was possible. In the two schools with both established connectivity and also more widespread experience in the use of technology in teaching and learning, students were taking their devices to the various specialist classes and to a variety of spaces within the school. Such flexibility was also adopted by students in a third school, particularly once the wireless was established to a point where outside activities were possible.

The planned home/school links in most schools were also constrained and in some cases did not eventuate. The main reason for this was the schools’ concern that the students had not had sufficient experience and understanding of internet use in the classroom to use it at home and they also saw potential problems with viruses. Interestingly, even in schools where the device was not taken home, students were ‘more able’ to access home computers and the Internet. It was notable that, since the pilot began, parents saw computers as having greater ‘value’, and this in turn had encouraged families to make home computers more accessible to the students. Where they did eventually go home, typically towards the end of the year, schools reported positively on the outcomes. In one school, for example, where computers were not common, the parents talked of their increased appreciation of the capacity of computers. They were ‘amazed’ at their child’s motivation, responsibility and learning. Some planned to purchase one for the family. In another two schools however, it was noted that the initial enthusiasm to work on them at home decreased slightly over time.

5.2 The Interaction between Teachers and Students

The teachers and students identified changes in the ways they interacted as a result of the devices being present in the classroom. From the teachers’ perspective, students were motivated by the use of the device itself and became more engaged in their work tasks, which in turn meant they did not require as much ‘hands on help and time’. From the students’ perspectives, the teachers were ‘freer’ to spend time with the ‘kids who really needed it’, as well as giving them a chance to study and do the tasks they were ‘really interested in’. Moreover, the students felt that ‘with the devices, there is more to do, and you can just get on with your work’. Both teachers and students identified new communication practices that were occurring, between teachers and students in and beyond the classroom.

In three of the sites, the teachers felt students were more self reliant in the classroom, agreeing that the students ‘seemed to ask them for less help’. When asked why this might have occurred, they all referred to the increased degree with which they were preparing their students for ‘virtual’ work, which required them to think more about the issues the students might encounter. They also provided their students with detailed instructions about how the task could be completed and in most instances, each of these teachers would give their students an example of what form the finished work might take. Such approaches led to significantly greater scaffolding of tasks. At most of the sites, teachers noticed that there were fewer questions from the students, about how to complete a task or how to use the device, than had been anticipated or experienced in relation to ‘normal everyday activities’.

Furthermore, most teachers felt that their students were more inclined to turn to their peers to resolve issues before requesting assistance from the teacher. The ‘ICT expertise’ of the students in their classes was well recognised. In one site the students were specifically asked to approach peers before approaching the teacher with an ICT related question and in another there were identified ‘expert’ students that others would go to for help when needed. One teacher commented that she had tried to achieve peer-tutoring and assistance in writing tasks over a number of years of teaching but had not achieved it. She felt the difference may have been in the
students’ perception of the teacher as expert in pen and paper technologies, and their peers as experts in ‘digital literacies’

An increase in the use of email as an efficient medium between student and teacher was highlighted at most sites. Students noted that teachers would send a group email more frequently to a whole class, giving instructions, or links to virtual environments where learning tasks were placed. One student commented that it was good to receive work in this way, as a point of later reference. The students in another classroom ‘liked the weekly emails’ sent to both the parents and students, reminding everyone about what would occur, and what was required. In this email, the teacher also provided links to showcase individual student work. The students appreciated their teachers responding to them out of school hours. Prior to the devices coming into the classroom, students had used emails minimally to communicate with teachers, and most commented that they would not have emailed their teachers ‘after school’.

Teachers thought their students had become ‘more succinct in asking for help by email’. In two schools the students had previously only sent them emails ‘which were more personal in nature. Now, however, they would send drafts of work with specific queries, or alternatively a cut and paste of teacher directions with specific queries. Students would also use email as a way of brainstorming ideas, and ‘running ideas’ by others. The students at some sites had also ‘appreciated’ the teachers being available out of school hours and some were sending emails until late into the evening. Whereas at the beginning of the pilot, teachers had eagerly responded to the students queries, noticing how ‘enthusiastic they were to do school work’, by the end of this study, they considered this practice unsustainable.

In some schools, another mode in which the teachers and students communicated was through ‘Instant Messaging (IM)’. This occurred in two different formats – through IM chat in virtual spaces, and through IM in intranet software. In two sites, the students and teachers interacted in virtual worlds, through an Education space and through a collaborative online game space. In both instances, the students and teachers were able to see when the other was online, and there were frequent communications in these forums. Such communications sought clarification on tasks, assistance with difficulties, and often there would be ‘follow up on events which had occurred’. The teachers who used these forums commented that the students who were quiet in the physical environment were ‘much louder’ in the virtual spaces. Similarly, the same students felt more confident to ‘join in classroom activities because there wasn’t pressure to compete. The window for their contribution was bigger, as from their perspectives, regardless of when they participated, what was ‘said was still said’.

A change in dynamics within the classroom was also seen in the sites using IM software. It was used to give instruction, provide assistance or to ‘check on what students were doing’. The students also used IM to chat with each other. Whilst their conversations did at times contain social content, in general they remained on-task. One student felt that he talked less because of the device as there were so many other ways in which he could communicate with peers. In these schools, the IM software was also used to facilitate learning discussions. One teacher stated that he would regularly provide a scenario to be resolved by the students without the use of voice in the classroom. He reported that it took a number of weeks for them to communicate only in text, and that still, over a number of months, students would be trying to complement what they had written with their voices.

The use of IM generated the need for discussion and decisions about other ‘communication skills and behaviours which needed to be taught. These were related, for example, to the types of language which were used in these spaces. There was an expectation from the parents and other teachers that the students use ‘proper English’. However, the teachers in these spaces were satisfied with the use of a ‘social dialect’ in IM and the use of traditional English in other genres of work. One teacher commented that this was important if ‘learning was really connected to the
ways that students lived’. Each of the teachers concurred, however, that there were virtual behaviours to be managed. The use of capital letters, for example which in some forums represents yelling, was strongly discouraged, as was ‘dissing’ someone, which is repetitive messaging and making defamatory comments whether in humour or not. Those teachers in the Virtual IM also taught students about who should be spoken with, and what information should be given, when making ‘new online friends’. One of the spaces used was a virtual online game which is moderated by teachers, and only inhabited by other students of a similar age group. The teacher would receive reports about student activities and interactions online. She would share them with the students in order to encourage them to become more critical of the ways in which they communicated with others.

In two sites, the teachers also used technologies to override student devices. In both of these instances, the teachers reported that they would often give global messages ‘similar to FAQs (frequently asked questions)’, or to alert students to time constraints. In one site, the teacher controlled the devices in order to provide instruction and also to ‘correct the way the kids were behaving online’. Through his software, he made all of the screens visible on a whiteboard in the classroom as ‘this helped the students remember that what they were doing could be seen by others and that they were also accountable in their learning’. As these images were projected, the teacher would make comment on student work both orally and virtually.

5.3 The Ways in which Teachers Present Work

The schools in this study, as previously mentioned, varied in their practices prior to the 1:1 eLearning pilot. However, in all sites there were changes in the ways teachers were presenting work to students. As one teacher expressed, ‘just having the devices in the classroom makes you work a little differently’. These changes could be observed through the increasing uses of word processing, publishing softwares and multimedia programs within teaching and learning. Most also constructed environments and learning spaces in which work was stored and uploaded.

Teachers, for example, used word processing and publishing software to present learning activities to students. They prepared Word documents, often including images, which ‘guided what the students would do’. One reflected that previously they had photocopied work from other sources, and included directions that were handwritten on these sheets to guide the students. Now the students would complete the worksheet on their device and then save it to their home directory. Similarly, home learning tasks were typed and stored on various student ‘portals’. As a result of these changes, teachers observed less paper being used in the classrooms.

Teachers and students also increasingly used publishing software and PowerPoint to present work in ‘more visually pleasant ways’ Teachers, for example, described the ways in which they used PowerPoint to provide information to students about set tasks, or various content areas, with one commenting that ‘teaching with PowerPoint makes the content seem more interesting’. Another highlighted her growing competence in constructing a presentation, and her increasing integration of various media. Students were also taught to use desktop publishing programs and PowerPoint in order to visually present work.

Knowing that the students had access to a device meant that teachers were able to individualise the work provided for different students. Some constructed ‘podcasts’ or short media clips to present work to their students, creating visual and audio segments. One teacher, for example provided the weekly ‘dictation’ in a media clip, which meant that students could choose when to complete the task rather than ‘all do it at the same time’. The same teacher reflected that an unseen benefit of this practice was for the students with learning difficulties as they could replay the clip as often as they required. Podcasts were also constructed to provide stimulus for inquiry learning. In one site, the teacher constructed a short media clip with content information in order to motivate ‘student curiosity’.
5.4 The Ways in which Students Work and Learn

In all of the sites the teachers commented that the students had changed their ways of working. There were three ways in which these changes could be observed. Firstly the students were more engaged, prolonging their attention to work on tasks. Secondly, they approached work tasks quite differently, shifting between cooperative and independent working modes, and thirdly, they presented their work in new ways.

Anecdotal comments by five teachers suggested that the students in their classrooms remained on task for longer. The teachers believed that having the devices ‘to themselves’ gave the students greater autonomy in the way they worked, increasing their motivation to apply themselves to tasks and take more responsibility for their own learning. One reason for their greater commitment to the tasks, suggested by a teacher in this study, was because of his threat to remove the devices if students did not behave appropriately. Another suggested that it was because the devices were novel to the learning space, but there were some fears that over a sustained time, the ‘novelty might wear off’. A third teacher stated that the difference was ‘easily explained’ as the use of the devices generated information beyond what a print text could, and enabled more interactive activities in the classroom.

Many commented that students who had previously ‘wandered off task’ or refused to engage were much faster to attend to tasks and remained attentive to these tasks. One teacher told the story of a boy with significant learning difficulties who was now eager to use his device to do work in their ‘free time’ rather than play games.

Use of the devices transformed the way that some whole class activities were conducted, providing opportunities for some students to succeed where previously they had struggled. ‘Fast maths’ or ‘Number Bingo’, for example, where students typed their answers into an excel spreadsheet, allowed students with low level fine motor skills to achieve far better results than had been possible when using pen and paper. Likewise, creative writing and spelling improved when these students were typing rather than hand writing their words and stories. As a result, their increased confidence and enthusiasm in the classroom were evident. Significant improvements in school attendance were also noted, particularly in regard to previously disengaged students.

The depth of student learning was also noted, particularly as students explored specific topics on the internet. Their capacity to look critically at and appropriately use the information was increasing, as was their ability to present this information both succinctly and creatively.

The teachers also observed a change in the ways that students would dynamically shift between working independently and cooperatively. Regardless of the ways the tasks were set, students often communicated amongst themselves both virtually and orally, discussing their approach to the work and their learning. During observation in the classrooms, it was not uncommon to see students move between cooperative and independent tasks, only to revert to the other mode in short spaces of time. Teachers commented that students collaborated in a number of ways with each other in completing tasks simultaneously. At the same time that students were communicating and collaborating online to complete a task, they were also communicating and collaborating in person in regards to the same task. Often there were further collaborations outside of the self-selected or teacher-selected groupings. In one site the students were consulting students in another classroom, and in another they were consulting with multiple people in a virtual forum.

The way in which students presented their work changed significantly in all sites. Through the use of a number of software applications, the students ‘were able to demonstrate their learning beyond the flat page’. As discussed previously, they became more confident and competent in
their use of word processing and publishing packages. They presented works as menus, web-pages, reports, posters and various types of PowerPoint presentations.

Teachers also encouraged students to present their work in ‘multimodal’ forms. Where this occurred, students would enthusiastically incorporate other technology into their work, including the use of still and movie cameras, mp3 recorders and scanners. Often working collaboratively in teams, they would create montages of photos or other images and then record narratives to produce a documentary as a factual text, resulting in multimedia representations of learning, including short movies, photo stories and music and other audio files. Although one teacher felt concerned that at times students were more interested in what they were producing as opposed to the knowledge or learning which was present, a number of teachers commented on the speed with which students ‘picked up the new technologies’ and also ‘finished pieces of work at much better quality’. Their pride in discussing and presenting their work was evident, particularly in those students who previously had been reluctant learners.

6 FACTORS INFLUENCING THE SUCCESS OF 1:1 ELEARNING

Our observations and interactions within the sites of this study, have led to the identification of a number of factors which we believe contribute to, or alternatively hinder, the successful implementation and introduction of 1:1 eLearning in classrooms. In this section, we discuss five factors that need to be taken into account in any future implementation of 1:1 eLearning.

The first is the influence and effects of hardware and existing information technology infrastructures within schools. Secondly, we discuss the impact of individual teacher attributes related to their confidence, commitment and creativity in integrating technology. Thirdly, we suggest that the level of commitment to a particular pedagogy, or the ability to move between different pedagogical approaches as a result of deep teacher professional knowledge has a strong influence on the efficacy of both a teacher and a school to implement 1:1 technologies. Furthermore, we stress the need for effective and ongoing professional learning and describe the ways that teacher ICTs knowledge enhances and detracts from the possibilities of 1:1 eLearning. Finally in this section, we highlight the ways in which leadership within the school is able to simultaneously drive and support classroom practices, and how this enhances the everyday work of the teachers in some of these sites.

6.1 Information and Communications Technology – Infrastructure and Hardware

The study provided insight into the influence of ICT hardware, infrastructure and support on the learning process within a classroom. This section describes the extent to which local infrastructures within the school, such as stable, secure and compatible networks and wireless connectivity, are a necessary foundation for the implementation of the 1:1 devices. It also details the ways in which external systems and support affected the implementation of this pilot, as well as highlighting the ongoing need to budget for technical support and skilling of teachers in order to manage a ‘just-in-time solution’.

Infrastructures within schools

A number of issues, in regard to the capacity of the local IT infrastructures, were identified as detracting from the successful introduction of the 1:1 devices in this study. These issues were predominantly associated with the quality of the existing local networks, and the connectivity of the devices. Ease of internet access, wirelessly and remotely, was initially expected to be a key benefit of the mobile devices. However, many of the sites experienced obstacles in their access to the Internet and some discovered that they did not have the resources required to keep the devices running in their most efficient mode. In addition, schools that had significant conflicts and issues with the implementation of the devices themselves, had not ‘counted’ on the additional funding
which was required to upgrade their networks and internet accessibility. In some instances, these various factors caused delays of up to eight months in making the devices ‘fully functional’.

All sites reported on the significant workload required in setting up the devices, and connecting them to their networks. Some discovered that although their network had satisfactorily operated for the number of computers previously housed within the school, once the 1:1 devices were introduced, the server became markedly inefficient. In particular, schools experienced slowness of the network in ‘log-on’ time and in accessing files on a home directory. As the devices did not have a CD-drive, teachers at three sites loaded discs into a CD stacker. However the increased traffic in accessing the content of the discs limited accessibility, so that programs were no longer usable. Two schools described the ways in which they needed to change their system of logging on to the server so that the new devices could be recognised on the school server. In order to improve these capabilities, four schools purchased or upgraded their servers.

Similarly, across the sites in this study there was varying access to the Internet. Prior to the introduction of these devices, only two schools had wireless access to Internet networks. These schools were able to utilise wi-fi on the devices from the time they arrived, but both found they needed to add further wireless points in order to cater for the increased traffic on these networks.

In contrast, the other schools had difficulty accessing the Internet wirelessly due to their existing facilities. Two schools reported that, at the outset of this project, they only had access to ‘non-broadband’ internet. Progressively, new access points and routers were set up in the schools. However, some still required the students to connect via Ethernet cords well into the year and in one school, wireless connectivity was not achieved until three weeks prior to the end of the school year. Most teachers were very disappointed in the ways in which this connectivity impeded ‘more flexible ways of providing learning opportunities’.

Schools commonly noted that the financial and physical resources required for the implementation of 1:1 eLearning were significant and, in this pilot, had not adequately been taken into account. Similarly, schools believed that their implementation would have been far more successful had sufficient time been available to ensure that adequate equipment, storage and processing capabilities, and connectivity were in place.

**Infrastructures outside of schools**

Schools, overall, are both supported and guided in their everyday practices and policies around technology use, by their State educational body and its associated ICT divisions. Some of the schools in this study were also supported by additional external agencies, including ICT related companies. These government and non government influences affected practice within the schools in a number of ways. In the first instance, security protocols often complicated internet availability and network access. In one case there was also conflict between the required IT protocols within a school and the infrastructures which had been constructed externally. However, there were other schools where aspects of the external infrastructures complemented the work of the teachers in implementing 1:1 eLearning.

In one way or another, all schools were forced to re-examine the security protocols within their pre-existing IT infrastructures. In most instances, these protocols were in some way directed by the policy of that state. For important protection of school networks, firewall and virus security are often set at high levels to ensure the integrity of the system, and to protect the linked educational bodies and associated users. In some sites, this created tension over the ways in which these could be altered to ensure access and connectivity for the extra devices, especially with regard to providing links to the students’ school directories from outside the school.

Another security practice, which often hindered the day to day effectiveness of 1:1 devices, was the use of multiple passwords to connect students to the various networks and protocols. In one site, for example, the students first logged onto their device and then onto the school network.
After logging onto the school network, the student had another password to access the internet and a further password to access ‘common educational learning spaces’. Whilst not all schools in this study experienced this challenge, variations were identified throughout the sites. Memorising the numerous passwords presented difficulties for students, particularly those in younger classes. To address this, some teachers developed a compilation, which was ‘frequently drawn upon in the classroom’.

In two sites within this study, there were conflicts between the internet protocols of the educational body and those required and installed for the 1:1 devices. An external consultant for one of these sites explained that this often occurred where different parts of the infrastructure and the imaging of the devices were executed by different organisations. In this particular site, the consultant’s organisation was sourced to provide ongoing computing solutions and maintain the internal networks of the school. External to the school, but managed by the educational body, was another group who were responsible for setting up the ‘bigger networks and infrastructures across the State’. In this case, the demands of 1:1 eLearning in this site were different from ‘the normal or more average school’.

In four of the schools, there were also some external infrastructures and resources which complemented and extended the use of 1:1 devices in the classroom. These schools had access to external environments in which teachers could build collaborative or virtual learning environments. These environments had ‘excellent’ accessibility whilst remaining ‘safe and secure’ spaces for the teachers and children to work in. One teacher commented that he had really enjoyed the opportunity to construct virtual worlds in which his students could engage. Having this infrastructure outside of the school, provided rich and well supported learning environments that both himself and his students could access. Similarly, another teacher commented that, in an external collaborative space, she was able to learn, alongside other colleagues, about the different approaches that were possible in setting up virtual learning environments.

**Hardware reliability**

Participants at all of the sites in this study concurred that the reliability and capabilities of the device influenced the successful implementation and long term sustainability of 1:1 eLearning. Both teachers and students identified a number of strengths and deficits in regard to the devices. In considering their future plans for 1:1 eLearning, all of the schools highlighted how important the quality of the device is in successful implementation, with one teacher commenting that ‘with the right device, and everything else working well, [1:1 eLearning] just naturally happens’.

The strengths of the device, identified in this study, were in its physical appearance, size and portability. All of the schools praised its sturdiness. Teachers generally liked the thick and strong plastic casings, and also the ‘solid handle’ with which the students carried the device, although one initially expressed concern about ‘being responsible for all of the computers’ and what might occur within the daily movements of classroom practice. She had wondered, for example, how many devices might be damaged when accidentally knocked from tables or when dropped in someone’s schoolbag on the journey to and from school and home.

In principle, the schools liked the compact size of the devices, which they believed made them more flexible, portable and secure. They praised the way in which the devices could move with the student from place to place around the school, as occurred extensively in some sites. Even within a classroom, the teachers believed their size enabled them to be used more flexibly. One teacher felt that ‘with a laptop, or even a desktop, you have to make sure there’s at least a desk the students can work on, whereas with these, they can work anywhere’.

The teachers and principals in this study believed that the size and light weight of the device also made it more secure. They contrasted the size and luggage involved in carrying a laptop, with
that of the device with its potential to enable younger students to ‘merely pop it straight into their school bag’. This more discreet carrying of the device was considered safer when the students were transporting their devices beyond the school’s boundaries.

As detailed below, the teachers also identified some drawbacks of the device, related to start-up times, limited battery life and memory storage capacity and the size of the screen and keys, as well as some non-specified technical issues.

All of the schools reported slow start-up times on the device. Across the study, start-up time averaged approximately four to five minutes. Teachers reported that in some instances the devices became slower as the pilot progressed. Teachers reported that students often became frustrated and impatient with this and some used it as an opportunity to ‘play around with friends’. One teacher commented that when she redirected a student back to work, he replied that there was nothing he could do because ‘everything was on the computer and he just had to wait until it was ready’.

Battery charging was a challenge in many of the classrooms and the limited battery life of the devices increased this challenge. Teachers commented that it would be ideal if they had batteries which would ‘last a whole day’. Different classrooms attempted to resolve this in a range of ways. In one school, the students were required to charge their devices at home, and return them fully charged each morning. In another, the teacher created a ‘charging hub’, where the students would place their devices when not being used to ‘top up their battery life’. Most of the sites contended with extension cords across the classroom, or around the perimeters of the classrooms. Teachers agreed that this presented some safety issues in students’ moving around the classroom with the risk of tripping over a cord. One teacher commented that a short battery life meant ‘we simply can’t use the devices for the purpose that they are made’.

The limited memory and storage capacity that the devices came with also restricted use. Two of the schools in this study had the specifications altered upon delivery, as they believed the devices did not have sufficient processing speed or memory to efficiently run their local suites of applications. As previously described, some schools responded by providing students with dedicated network memory, while others used external memory devices such as USB thumb drives. This limited memory capacity, some teachers claimed, slowed down student retrieval of works-in-progress, and especially larger media files.

Schools that used and created multimodal media files commented that the screen size often compromised the quality of files and viewing pleasure. In using some applications, the images did not fit on the screen, and the students needed to ‘shift their desktops’ in order to see the clip in its entirety. In instances such as this, students preferred to work on a desktop or larger laptop computer.

In three of the sites, the teachers and students commented that the keyboard was too small for ‘larger fingers’. Whilst the keyboards were suitable for the majority of the students, the teachers commented that, for the students finding it too small, work became ‘very clumsy’ causing some to become ‘more resistant’. External keyboards ‘defeated the purpose of a small and compact device which could be easily toted’.

A pressing issue in this particular study was the more global reliability of the machines. All schools experienced the ‘breakdown’ of some devices, which required them to be returned for repair, and in some cases replacement. Teachers, students and principals all reported the overall disappointment when the hardware let them down. In some cases, where teacher confidence was already low, in regards to IT skills and knowledge, the hardware errors further contributed to the anxieties they faced in integrating 1:1 eLearning in their classrooms. For other schools, the breakdown of devices delayed the learning of the students, or ‘broke the momentum of great
things happening’. Added to these issues were unforeseen collapses of the businesses which had carried the warranties for these devices.

6.2 Technical Support

Across the sites in this study, staff highlighted the challenges which occurred as a result of a lack of both ongoing, and ‘just in time’ technical support. The schools had staff with varying technical expertise in both setting up, and maintaining computing networks and devices. Furthermore, the schools had different budgets and arrangements with external providers of IT assistance. While those schools with strong commitments to IT maintenance were able to circumvent ‘just-in-time, and other imaging issues’, ongoing ‘technical tweaking’ redirected teacher foci from teaching and using ICTs within classrooms. Similarly, a lack of technical knowledge and expertise further compounded teacher issues of confidence in integrating ICTs, and the ongoing ability to use devices without ‘always wondering what is going to go wrong in each session’.

In most of the sites, the principal, or another school staff member were ‘technically savvy’ enough to ‘deal with most of the day to day issues’ which arose. In one of these sites, the departure of the principal highlighted the difference that her ‘in-house’ technical expertise made. The teacher in this study described the ‘steep and often impossible’ task she had in learning to manage the technology, as well as ‘how dependent the success of her classroom’ had been on her this principal, in ensuring the day to day reliability of the devices. In two of the sites, staff were reliant upon external agencies to manage ‘even the basics of making sure the computers were logging onto the right network’, and in ‘making sure the programs were installed and running’. One of the teachers in one of the these schools described her frustration in having ‘to wait two days for someone to come to the school, to fix a problem that took … three minutes to fix’. Some teachers in this study felt that a ‘particular level of IT competence of the teachers was assumed by IT people outside of education’.

All of the sites had some ongoing relationship with a non school based provider of IT support. At the most basic level, all had access to their Education Department’s infrastructure. Some schools, however, also ‘sought extra assistance outside of the Department to deal with the additional IT endeavours the school had initiated’. Two schools had an ongoing arrangement with a private company which imaged and managed computers on the network, as well as the licensing agreement for their virtual access to networks. In another two schools, the Departments had outsourced the maintenance and technical support of networks and devices to a private company. The other two sites in this study were reliant upon Department support, when ‘it was available’. One of the principals in these schools commented that whilst the Department was doing its best, the ‘technicians were just too thinly across too many schools’. Most schools commented that more resources needed to be dedicated to ICT maintenance and support, especially in successfully introducing ‘so many new devices into a school at one time’.

In this study, the providers of the devices attempted to provide as ‘much support as they were able’ in the initial phases of this project. This support was offered in the form of additional wireless routers, occasional network support and additional hardware in some instances. As previously mentioned, hardware in this project, and their warranties were further supported through private companies negotiated by the initiators of this research project.

6.3 Teacher Attributes

The teachers in this study were all enthusiastic about their involvement. As highlighted within the case studies, there was a wide range of expectations aligned to the introduction of 1:1 computing. Arising from this study, we believe that the most successful implementation of the devices and further ongoing integration of technologies were strongly influenced by attributes of
the teacher within the classroom. These attributes, as detailed below, can be described as resilience, confidence, preparedness, creativity and commitment to the initiative.

**Resilience**

In this study, we define the resilience of a teacher as his/her capacity to respond to adverse circumstances in positive ways (Masten, 2001).

During different phases of this project, teachers were provided with unforeseen challenges which were local to their particular contexts. Teachers responded to these challenges in a myriad of ways, and in many instances these responses enabled growth and confidence in new aspects of both student and teacher learning. Alternatively, there were also examples of when a teacher’s inability to respond to local challenges limited the ways in which 1:1 eLearning were integrated within classroom practices.

All teachers, at one stage or another, were frustrated or disappointed with regards to the implementation of 1:1 eLearning. This disappointment was predominantly linked to the technical issues previously outlined. Most of the teachers in this study were able to ‘look past immediate problems’ and to work ‘flexibly until all systems were going again’. In one site, when seven devices were not available for use in the classroom, the teacher developed ‘more co-operative approaches’ and encouraged students to share devices. He claimed that his students were considerate of those who didn’t have computers, ‘empathising about what would happen if they too lost theirs’. In another site, the teacher simply dedicated a particular desktop to a student, and other students moved their mobile devices to work near them, while in another the teacher held a ‘meeting just as one would in a business’, where he drew parallels between what was occurring in the classroom and what would happen in the corporate world each day, ‘just because your device breaks down, you cannot stop working’. The same teacher would also ask the students to reflect upon the different ways they were working between technology and non-technology times.

In these cases, the teachers were able to see the breakdown of the devices as part of the learning process. In order to ‘develop stronger practices and make these technologies work, someone has to just do it to find out what goes wrong’. Three teachers kept reflective journals which they hoped ‘would inform future technology plans within the school’. Whilst not all ‘of the glitches could be anticipated’, teachers often referred to ‘the fallback plan at the back of my head, just in case’ anything went wrong with the technology. For example, one teacher described the multiple places that his students would save work, so that if a device broke down, their work could continue to be accessed from other machines. This teacher commented that the most important ‘quality any teacher brought to working with technology was a strong ability to recover, and even more to teach the students to look for alternatives’. Overall, the teachers responded creatively and flexibly in dealing with challenges, and always remained focussed on the learning requirements of their students.

In two sites, there were instances where the hardship became too much for the teachers, and on a number of occasions, the devices were withdrawn from classroom practice. One of the teachers described how she had entered the project feeling ‘a little anxious’, and whereas another highlighted how when ‘things went wrong using the computers’ she ‘just panicked’. These teachers both felt that they ‘could not waste time out of the curriculum in dealing with computer issues’ and that it was more important to continue with the content of ‘what had been planned’. It is difficult for teachers to recover from adversity, when they have been unable to resolve the issue that they have faced. Thus, the capacity building of teachers is a crucial aspect of the successful implementation of 1:1 eLearning.
Confidence

The confidence of teachers across this study varied. Teachers who identified themselves as ‘confident with ICTs’ at the outset of the project were most quickly able to integrate the devices into everyday classroom learning. Moreover, teachers who were ‘confident in their teaching ability’ were more likely to take risks with the technologies, and recover from hurdles they experienced in their teaching. In this study, it was clear that the confidence of a teacher in a 1:1 eLearning environment was often tested by the challenges which were experienced.

Teachers who commenced this study with confidence in their own ICT knowledge and experience in using ICTs in the classroom, were the most eager of the group, and very quick to ‘go beyond the basics’. Prior to this study, a number of teachers had participated in explicit professional development about the use of ICTs in classroom practice. Similarly, four of the teachers in this project had received the devices with strong ideas about the ways in which they would be used for learning. These teachers, and their students, were very enthusiastic about meeting the challenges and ‘pushing the boundaries of how we normally work’. These sites were highly motivated, and were experimental in the ways that teaching occurred, and learning was represented. The teachers in these schools took risks in trialling new applications, and were often ‘unfazed when things didn’t come off quite as they should’. These teachers were the most aggrieved by hardware difficulties as they saw them as hindrances to ‘the good things we are doing’ and to the ongoing ‘momentum just as students were really developing good stuff’.

The teachers who were not as confident in the beginning of this study, were the most vulnerable to the consequences of hardware and other challenges. These teachers saw a direct relationship between their own ability and the challenges in ICTs. In one instance, this was highlighted when a teacher had been unable to log her students onto the school network. The error had occurred as an IT consultant had renamed the network and the teacher had not realised that the connections had needed to be reset. When another teacher resolved this issue for her, this teacher commented, ‘if I was confident about computers myself, I’d probably try and fix things, or get the students to do things – I feel powerless’. This teacher reported that her own classroom confidence ‘had really taken a knock’, and she resented the apparent student knowledge which was stronger than hers. Whereas she had ‘always been a strong teacher in the classroom’, she felt that ‘the students didn’t see her as the expert anymore’. Another teacher felt that ‘until I (sic) become stronger with ICTs, I don’t want anymore computers in my classroom’.

Preparedness

There are many ways in which the teachers felt that they could be better ‘prepared’ for effective implementations of 1:1 computing. All of the teachers in this study thought that it would have been useful to have received Professional Development in the effective use of 1:1 eLearning in the classroom. This will be discussed in a subsequent section. However, beyond these initial claims, they suggested some ‘basic strategies to assist teachers’.

Teachers believed that, prior to commencing, there should have been a comprehensive introduction to 1:1 devices in the classroom, which focussed more on the device itself and also provided the opportunity to become familiar with the applications available on them. For example, prior to the pilot’s commencement they had been told about a capacity to ‘use the classmate software to control student screens’. Although used by some schools, it was a largely underutilised resource on the devices. They also needed to be better informed about the challenges and strengths of using the devices and its applications in the classroom. In this study, the teachers worked on laptops connected to the devices, and typically did not access the devices until ‘the students had a problem’. One teacher reflected that if he had used the device prior to the students, he could have more readily anticipated some of the questions and issue which arose in the early stages.
Many of the teachers and principals in this study suggested a longer lead time should be made available before schools introduce 1:1 eLearning within schools. Whilst in some cases the schools were ‘ready to go’, the majority had the devices but the various delays and issues were time consuming and disruptive and often resulted in ‘teaching on the run’, rather than learning the capabilities of the devices and considering them in regard to the curriculum. As a result, a number of teachers commented at the conclusion of this study, that this trial had felt more like a ‘dress rehearsal’, but they now felt they were ‘ready to really use the devices to teach’. All of the teachers felt that the best in their practices were ‘yet to come’, now that they ‘knew what it was all about’.

Creativity

There was a difference in the way that teachers approached the use of the devices within the classrooms. In some instances, the device was seen as a virtual replacement for paper and pen activities. In other cases, the devices were seen as ‘a box of possibilities depending upon who was driving it’. Whilst the more creative practices predominantly belonged to those teachers with some background experience in ICTs, evidence of emerging creative practices with less experience in ICTs was beginning to appear.

In two classrooms, the device was used in the equivalent ways to pen and paper activities. The main applications used on the devices were word processing and a publishing software. In one of these classrooms, the students demonstrated the ways in which the directories of their home drives were set up to mirror the ways in which their exercise books were petitioned. Instead of opening their spelling book to complete a test, the students would open a new blank page, located in their electronic folder. Similarly, when the students generated a project, they would use a basic publishing application to include images and texts, ‘laid out in exactly the same way you could a poster’. The teachers valued the functionality of the devices in their teaching and learning, referring to the ‘efficiency’ of the devices, in consuming ‘less paper’ and requiring less ‘presentation space around the classroom’. They also felt that the activities were enabling students to learn basic ICT skills such as organising and filing their work.

In other classrooms, the teachers may have commenced with functional approaches, considering the efficiency of the devices, however they recognised or learned about other possibilities. One of the teachers described how she had commenced the trial ‘quite tentatively’ and had made the decision to ‘start with all the programs I (sic) usually used to get my own day to day work done’. This teacher used databases for organising information, spreadsheets for mathematics, and word processing for general communications and language based tasks. She reported that she ‘had become bored’ and was looking for ways that the ‘computers could be used in different ways to help students represent what they knew or had learned’. Through discussions with other peers, both locally and virtually, the teacher also trialled basic media applications and began to ‘experiment with desktop publishing programs which had students working with images’. Along with other teachers, this teacher commented that ‘more creative ways of using the computers seemed to challenge the kids more, and make them forget that they were doing the same hard work, but in different ways’. The teacher commented that at times she ‘forgot how young the children were because they could do the digital things so easily’ whereas she had found them ‘quite challenging’.

There were two classes, in this study who were, from the outset, determined to integrate the devices into ‘every aspect of the classroom’. These teachers were well equipped with a range of tools and applications that could be used, and ‘encouraged the students to use whatever worked best to achieve what they wanted to achieve’. The students in these classrooms were encouraged to experiment with a range of different applications. The teachers in these classrooms also experimented with the ways in which they presented works to students, and further in the ways they worked within their classrooms. Within their creativity, it was ‘taken-for-granted that
mistakes will happen, and where a mistake happens you know not to do it the same way the next time’. One of these teachers remarked that ‘in order for ICTs to work, you have to realise that you just can’t work the same way...you need to work differently, and your students will work differently’. He commented that when such an opportunity arose, it was important to ‘run with it and learn as much as you can from what the kids do’.

Commitment to Innovation

In this study, there were varying pedagogical and philosophical commitments to the introduction of 1:1 eLearning. Within the school communities some parents were concerned that ‘the computers would take the place of handwriting and other skills that are important for life, like maths’. Teachers also grappled with some of these ideals, and sought to negotiate new spaces that could address the varying curriculum demands. Concerns were expressed in one school for example, that the ‘computers changed the nature of learning’, making it less collaborative’. Their impact on the students’ preparedness to undertake the handwritten standardised national assessments was also raised. These considerations affected the ways the 1:1 classrooms were approached and how schools regarded future use of the 1:1 devices.

Whereas four of the sites were already recognised for their ICTs competencies and enthusiasms, two of the sites were trialing what impacts the devices have on ‘normal classrooms’. The motivation for participation in this study was different for each of these schools, and in turn, their commitment to and ‘sense of ownership’ of what was happening also varied.

In the three ‘more experienced’ sites, the impetus for discovering the impacts of 1:1 eLearning was strongly driving the practices of the teachers, and the type of support they were given. In these sites, the teachers were considered to be ‘key to the success’ of these new practices. From an external positioning, these schools appeared to have already committed to and invested a great deal in the notion of 1:1 eLearning, based on a belief in its benefits, and chose teachers most likely to enhance this approach. The teachers felt supported and committed and were always keen to show their new approaches and learnings. Where they had suffered setbacks, they were keen to understand why, and to adapt practices accordingly. These teachers were, thus, also committed to investigating the ‘ICTs phenomenon’ and were prepared to ‘do whatever it takes to make this work’.

In another two sites, the teachers were less committed to the long term interests of the pilot, as they ‘were not as far down the track as other schools’. They perceived this trial as ‘exploring the possibilities’ of having the devices within their schools. As the devices were seen as novel and ‘largely problematic’, they were more focused on weighing up the potential of 1:1 eLearning in their school. During research visits, they were keen to provide feedback on what had occurred in their context, whereas the other sites were curious to know what the others were doing, and to gain a sense of where they were ‘in the bigger scheme of things’. These schools were ‘weighing up’ how the devices were impacting on the specific outcomes of their students whilst the others were ‘loving the ways the students can . . .’. This commitment to, and sense of ownership of, the implementation of 1:1 eLearning strategies made a difference to the ways in which the teachers were prepared to ‘put in the extra yards’ in ensuring that ‘innovative practices’ were alive within their classrooms. In this study, it was the difference between making the devices work, and realising the limited capacities of the devices within their schools.

6.4 Pedagogy

The term ‘pedagogy’ is widely applied across educational settings. In some contexts it refers to specific strategies a teacher employs to facilitate learning (Kalantzis & Cope, 2005). In this study, we refer to pedagogy more broadly as the overarching approach a school or teacher is committed to, in developing learning over extended periods. In the previous section, which discussed changes to teaching and learning in the 1:1 classroom, we highlighted the dominant
ways in which we observed learning occur. In this, we referred to transmissive pedagogies, with the teachers in locus of control and directing student learning, as well as highlighting cooperative and inquiry pedagogies, where there is a stronger emphasis on learning through collaboration and negotiated experiences, more often generated by the students. By no means are we suggesting that teachers are working exclusively within one or another paradigm, but rather highlighting the dominant pedagogies from which 1:1 eLearning was implemented. In this study, we contend that the teachers who were most committed to a particular pedagogical approach were most successfully able to introduce 1:1 eLearning. These teachers had the capacity to know and adapt their particular pedagogical stance for the inclusion of the devices.

In the sites where student-centred, inquiry or collaborative approaches were used, the devices were introduced and utilised with the same approach. Students were presented with a number of possibilities for both undertaking and representing learning, and then made choices according to what was required. As this approach was largely student directed, teachers were available to assist where challenges arose, as well as to extend the repertoire of skills the students were able to apply. In these classrooms, there was strong peer support and collegiality, and often ‘other students were the first port of call’. Learning with the devices was considered ‘quite experimental’, and purposeful in that students were required to ‘problem solve’ in order to make the applications ‘do what they needed them to do’, as opposed to producing the work in the ways that others may have directed them to do. One teacher, in these schools, commented how ‘delightful it is to see what the students come up with . . . often much better than what I could do’. For teachers inexperienced in inquiry and collaborative pedagogies, the seemingly ‘unstructured and chaotic’ learning of ICTs would have added some anxiety to the teaching and learning demands of the classroom.

In a more transmissive and traditional classroom, the inclusion of the devices was very structured. Learning was ‘scope and sequenced’, and teachers mapped the ICTs learning against what would be required for the completion of a task. In one classroom, for example, the students were explicitly taught how to develop a digital slide show, which contained a title slide and five other slides for information. They all researched the topic of their choice and used their ICTs skills to present their work in this way. Similarly, in another school, the teacher believed the most effective learning could occur by teaching the students to use a number of applications and demonstrating exemplars of how the programs could be used. Whilst the teachers in these schools believed that ‘the students need to learn how to use the programs properly before moving to more advanced or exploratory use, they commonly described ‘how much time is taken from other learning areas’ in order to teach the ICTs in isolation. Another limitation highlighted by these teachers was in the repetition they observed in the ways students presented work. One teacher commented, “it was very exciting to see the students’ work come to life, but with so many PowerPoint presentations, ‘it got a little monotonous’.

Regardless of the particular preference that an outsider may hold in regards to classroom pedagogies, it was clear that these teachers, expert in different approaches were able to successfully use the technologies within their teaching approach. In two sites, the teachers were in the process of ‘rethinking the ways in which they worked’. In these instances, ‘at times it felt as though there were too many balls in the air’. The teachers in these sites described the ongoing tension between their abilities to focus on the content they were teaching, the strategies they were using to teach the content, ‘and on top of it all, getting these devices going’. One of these teachers insightfully commented that, ‘it is always better to have one thing going well in a classroom before introducing something completely new’. This stability, she reflected, also underpinned much of the expectation around the learning practices and habits of the students.
6.5 Professional Development

There were two types of professional knowledge regarding the use of ICTs which teachers had developed prior to this project. First, it was evident that two of the teachers had sophisticated technical expertise. With this expertise, these teachers were able to address challenges which arose in the classroom, in regards to the day to day practicalities of student use of the devices. For example, where students had difficulty logging onto the school wireless network, these teachers were able to ‘re-jig’ the settings with minimal fuss to enable students to proceed with what they were trying to achieve. These teachers were able to problem-solve the limitations of the devices and functionality of the devices as they were recognised, and had considerable confidence that ‘issues could be resolved fairly quickly’. For the other teachers, this IT technical understanding, ‘even at the most basic level’ would have been beneficial across the various phases of the project. These points were addressed in a previous section of this report.

Secondly, a number of teachers brought to this study professional experiences and knowledge related to pedagogical practices which incorporated ICTs. At the most basic level, some of these teachers ‘complemented’ classroom practices with ‘vanilla applications’ such as word processing and presentation applications. This group of teachers were also keen to develop skills in using media files, and in some cases online collaborative applications such as ‘class wikis and blogs’. At another level, teachers were using all of the previously described applications and in some cases were teaching in ‘virtual environments’, using Web 2.0 technologies such as ‘mudles’. In these cases, teachers were enthusiastic to learn about constructing environments for learning, and in integrating other applications to enrich student experiences. These teachers were constantly seeking new networks and resources in order to extend their understandings and repertoires of skill.

To enable teachers to work with technologies, and to successfully integrate them within the classroom, we believe, alongside the schools involved in this study, that professional learning and development of teachers is crucial. However, as highlighted through discussions with the stakeholders within this project, such support requires adequate resources and time. As one principal in this study commented, ‘this project has drained the PD [professional development] budget, and we’re only thinking about one teacher . . . not to mention the time and equipment we’ve needed’. Another principal, who had been instrumental in providing professional development and ongoing support for his trial teacher, was now handing over the responsibility for upskilling other staff to this teacher, who was to take on the role of 1:1 eLearning mentor and trainer over the coming year. Alongside this plan, however was his concern that this might detract from this teachers ‘opportunity to consolidate what he was currently doing and building’.

In some cases, the professional development intended as part of the pilot did not eventuate. Some teachers expressed disappointment about their achievements in their classrooms over this trial as a result of not participating in professional learning. One teacher stated that ‘she now knew exactly what she didn’t know’, and that the ‘learning curve had just been too steep’. As a result of her lack of professional knowledge in this area, the teacher described increased feelings of anxiety in working in the classroom. Whilst she was aware of the students’ enthusiasm in using the devices as much as they were able, she was challenged by thinking simultaneously about ‘what needed to be taught, and how she could do this with the devices’. She indicated that her school was going to make further professional learning available for her and other teachers who would use 1:1 technologies.

Another emerging thought about collaborative professional learning networks was echoed amongst the schools in this study. The teachers were all very enthusiastic to collaborate with other teachers, working in similar environments, both within their local contexts and beyond. The teachers and principals were also keen to learn from each others’ experiences, in what had worked over this pilot, and what had not. A number of teachers commented that they ‘would...
have liked the opportunity to meet with others in this project’ as they were ‘often caught up in what was happening right here’. In learning about the practices of others ‘it would help to gain some perspective on what we are really doing here, in light of the practices’ of others’. Teachers were excited by the possibilities of 1:1 eLearning ‘through the experiences of other classrooms’. They had also identified some possibilities for collaborations between the classrooms themselves.

6.6 Leadership

All teachers in this study were clearly a hard working and dedicated group of professionals, who had entered this study for a variety of reasons. In all cases, however, the impetus for the introduction of the devices, and the commitment to this study came from the leadership groups within the school, or external initiatives from departments of education. In some instances, the same person held a leadership position, and was the participant teacher. The ‘leadership’ within a school influenced the ways in which the study ‘came to life’ at each of the sites.

The teachers all agreed that the principal, and other leadership, is crucial in the success of any innovation in a school. Leadership takes many forms within education. In this study, the leadership was demonstrated through resource allocation, goal or direction setting, and ‘hands-on’ guidance and sharing of expert knowledge. One teacher commented on the importance of ‘having the principal behind what you do in the classroom’. In describing the principal as an advocate, the teacher detailed ways that Principals could ‘rally further support’. Another teacher commented, similarly, that ‘because the principal was fully supportive, other staff showed more interest, and my own leadership was given more status in the school community’. Teachers in the study believed their principals had strong influence, both within and beyond the school.

An educational leader is a key person in the day to day decision making processes of a school. In these sites, the principals allocated resources to support the implementation and ongoing delivery of 1:1 pedagogies and technologies. They ‘stretched the budget as far as they could’, but in all cases had not anticipated the costs and time associated with these new innovations. Where possible, the leaders within these schools took a ‘hands-on’ role at various stages in the project. The principal in one school, who had previous experience in introducing 1:1 eLearning, spent considerable time ‘investing’ in his teacher’s professional development and technical support. His prior experience gave him the knowledge and understanding needed to establish the processes, address specific needs and access resources. This principal believed that, for a teacher to gain ‘the most’ from the experience, ‘someone else had to be there in the shadows supporting them and helping them to realise the possibilities’.

Although the schools were at very different levels in regard to ICT implementation, all principals were keen and many were ambitious about extending the ICT practices within their schools. Some Principals were heavily involved in the process of introducing and implementing 1:1 eLearning in the classroom, seeing it as an opportunity to expand on their already extensive and innovative use of ICT in teaching and learning. These principals had been very ‘strategic in their overall staffing choices’ ensuring that all teachers who came to their school displayed commitment and skills in the use of ICTs’.

In these schools, the participant teacher was selected as a result of their teaching expertise and commitment to the effective use of ICT in the classroom. Alongside the principals they set the goals or outcomes that they were working towards. The teachers would discuss progress with the leadership teams, and from these discussions ‘next practices would be identified’. These principals had already committed extensive resources to ensure that effective technical support was readily available, and they had high expectations regarding what could be achieved.

In a school where the access to and use of technology had previously been on a much smaller scale the principal was keen to build on the implementation of ICT in the classroom, seeing it
potentially as a way to further personalise the learning programs of the students in her school, especially those with special needs. She was therefore very interested in observing, supporting and learning from the teachers’ progress and experiences in the pilot. As a result, she realised the ‘full implications for rolling these practices across the school’. Whilst previously the school had a number of computers for student use, the principal recognised the ‘completely different ways that the 1:1 devices’ impacted on the classroom and the students. Subsequent to the conclusion of this pilot, she was planning to build a more strategic ICT plan, scoping the ways that the school’ would be able to ‘meet the demands, we came to know during this pilot’.

Often the teacher, and others involved in this project, demonstrated dynamic leadership from within and alongside their practices. In one instance, the principal had been a key driver in the participation in this study, and during the study shifted workplace. Her replacement was not familiar with the use of these devices, nor ‘particularly experienced in this area’. The teacher became the person responsible for the ways in which the devices were used, as well as ‘taking on’ the support roles and the required administration. There were similar instances in other schools of the ways that these teachers were emerging as leaders because of their involvement in the 1:1 pilot. As mentioned previously, some of the teachers were becoming more responsible for the professional development of others, and were expected to take leadership in ‘driving 1:1 technologies even further into the school’.

7 RECOMMENDATIONS

The experiences of the six pilot schools have provided valuable insights into the potential benefits of implementing 1:1 eLearning in schools. The pilot, particularly as it focused on individual schools, each with their particular context, culture pedagogical approach and involvement in the integration of ICT, has also clearly shown that the outcomes and the levels of success are strongly influenced by a number of factors. In particular, these include the technology hardware, infrastructure and support available, the attributes of the teachers in the 1:1 classroom, their professional knowledge and commitment in regard to pedagogical approaches, their effective use of ICT in teaching and learning and their skills and confidence in using ICT generally. Leadership within these schools was also important. Stemming from this study, are the following recommendations for consideration in any future move towards 1:1 eLearning in schools.

7.1 Technical Capacity Building and Support

Prior to the introduction of 1:1 eLearning, the following technology infrastructure, equipment, processes and support must be in place:

- Networking infrastructure within the school, which provides stable, secure and adequate wireless connectivity and is compatible with departmental and other relevant networks.
- School servers with capacity to accommodate simultaneous use of multiple devices.
- Sufficient access points and routers within the school to enable flexible learning spaces.
- A review of firewall and virus security protocols and equipment to ensure compatibility with government policy of that state and understand scope in regard to providing links to the students’ school directories from outside the school.
- Devices that are robust and reliable.
- Devices, set up with the relevant applications, sufficient memory and storage capacity and/or strategies in place to expand this if required.
- Devices with sufficient battery life to accommodate regular usage over the day and/or sufficient, compact and safe options for battery charging.
- Access to and budget for ‘just in time’ technical support and training.
- Access to budget for adequate resourcing.
- **Sufficient lead time** to ensure all aspects are in place prior to commencing.

Once introduced into the classroom, ‘just in time’ technical support and maintenance needs to be available to ensure that teaching and learning in the day to day running of the 1:1 classroom is not stymied by what can often be very basic, easily resolved technology problems that arise in day to day technology use. This may be achieved by:

- The employment of an on site technology assistant.
- A local, easily accessible technology assistant shared by a number of schools.
- A phone or online help desk.

### 7.2 Teacher Capacity Building and Support

Prior to the introduction of 1:1 eLearning, teachers require significant professional development and support that will strengthen their capacity and motivation to provide successful 1:1 eLearning experiences in their classroom. This involves assisting them to deal more confidently with the challenges, be prepared to take risks and to think creatively about expanding the possibilities available when each student has a device. This should include the following:

- Provision of introductory technical training which focuses on the use and scope of the device itself and provides teachers with the opportunity to become familiar with the device and its various applications.
- Access to ‘just in time’ technical support (as mentioned above) for the resolution of and training in basic technical issues that arise.
- Professional development for teachers on effective use of technology in teaching and learning, with a particular focus on 1:1 eLearning. This should be designed to:
  - Increase understanding of the scope of 1:1 eLearning, its challenges and possibilities.
  - Increase teacher knowledge in regard to specific teaching and learning approaches and strategies that are enhanced through the use of technology (including student centred, inquiry based, collaborative learning and the provision of differentiated curriculum and personalised learning opportunities).
  - Provide examples of best practice, specific strategies and resources.
  - Enable teachers to apply their learnings to their specific teaching context.
  - Generate collegiality and ongoing networking amongst participants.
  - Provide access to relevant resources.
  - Provide sufficient time release to be involved in professional learning and to explore new teaching and technology options.

Ongoing professional learning and support will ensure continuing growth and an awareness of the rapidly increasing resources and applications to tap into. This can be achieved through:

- Involvement in teacher networks with a focus on building and sharing resources and best practices in 1:1 eLearning.
- Links to mentors within and outside the school.
Extending 1:1 eLearning across more than one classroom in the school to increase collegiate planning and support.

7.3 Leadership Capacity Building and Support

Leadership support within the pilot schools is vital to the success of 1:1 eLearning. Extending interest in the concept beyond those committed to innovative use of technology requires:

- Information on and promotion of the concept in relevant leadership forums.
- Links to principals who are already involved.

Prior to and during the introduction of 1:1 eLearning, more specific professional learning, networking and support is required to equip leaders with the information needed to effectively drive the project. This should include:

- Understanding the scope and impact of 1:1 eLearning in teaching and learning.
- Developing strategic plans for introducing 1:1 eLearning.
- Understanding the requirements in relation to technology, human resources, learning resources, learning spaces, funding requirements and lead time.
- Strategic selection of staff and technical support.
- Appropriate ways to inform the school community.
- Ways to access resources and equipment and budget.
- Available support.

8 CONCLUSION

In coming to this project, the various stakeholders held many expectations of what would occur. As highlighted at the beginning of this report, from the outset there was a clear set of objectives for what might be achieved within this pilot of 1:1 eLearning. From the perspective of the major stakeholder, Intel, they were keen to showcase exemplary practices of teachers in Australian schools, and identify the ways that the introduction of the device impacted on everyday classroom practices. The schools in this study wanted to demonstrate exemplary practices, and extend their own practices from where they each commenced. For the principals, Departments of Education and other stakeholders, participation in this pilot provided the opportunity to lead the educational march into the digital age. The students in the schools wanted their own computer, and their parents wanted to be part of something very special and for their children to have an educational edge. To varying degrees, these expectations may have been fulfilled, but more importantly, some incredibly rich learning has emerged that can inform new pilots and assist schools and larger educational organisations with strategies for implementing new technologies.

There is a general feeling amongst the schools that they have not yet had their moments to truly shine and fulfil their potentials. As described in the case studies and subsequent discussions, there were hindrances amidst the processes of introducing devices into the school. In some sites, the networks and wireless points were not adequate, and for others, they had just assumed that it would all come together when the devices arrived. We observed a number of outstanding teachers with advanced understandings and skills in using technologies across and within the curriculum, and also some outstanding teachers who were not confident in having so many devices running in one space.

In this pilot there were significant technical issues with the portable computing devices provided to schools, and this too impacted upon the ways they could be available within the various teaching spaces. Emerging from amongst these challenges, arose new learnings about the ways in
which schools and technicians, as well as providers such as Intel could work together on future projects to address the challenges. One suggestion was to clearly extend the lead time, in preparing schools to accept and work with the technologies, as well as to ensure that technically networks, devices and wireless capacities are all fully functional. The schools in this project state that they have now had the lead time, over this first year, and are now ‘ready to run’.

We have suggested a number of ways that 1:1 eLearning impacted on the classrooms, as discussed in detail in previous sections. The first impact of the devices was in the ways teachers used their learning environments. We highlighted the ways in which teachers adapted their classrooms in order to capitalise on the portability and practical requirements associated with the devices. We then described the ways in which teachers reflected upon their changing interactions with students. These key changes reflected new methods of communicating with students, with the assistance of the devices as well as the content. Teachers found that they could be more efficient in communicating with a whole class in ways that did not unnecessarily interrupt the flow of work from those students who might be unaffected by the communication.

In this study, there were also impacts demonstrated in the ways that both students and teachers worked with the content of day to day curriculum. In all of the sites, teachers noted changes in the ways they presented work to students, especially through the increased multimodality, drawing upon images, texts and audio modes. They also reflected upon the ways in which the work had previously appeared quite flat, and with the assistance of ICTs how they became more interactive. Similarly, the teachers and students developed new understandings about, and expectations of the ways in which students could not only present their learning, but also the modes in which they could work with one another. All of the sites in this project recognised increased independence in students as they engagement in learning tasks, along with an increased ability to also work collaboratively. Of particular interest to us were the ways in which students would interact with each other in a number of ways simultaneously. It was not uncommon to see students interacting with each other online as well as face to face at the same time.

Arising from the learning in this project, we have described five factors which we believe would strongly influence the successful introduction and implementation of 1:1 eLearning in schools. Firstly, in these discussions we have highlighted the importance of having a strong Information Technology infrastructure in place, alongside all of the necessary equipment, and different levels of technical support. Secondly, we have described the importance of capacity building and support of teachers as they embark on new professional endeavours. In this we have noted the capacities of creativity, adaptability, resilience and risk taking as integral to this endeavour. Thirdly, we have noted the crucial domain of teacher pedagogical awareness and understanding. We have claimed that for the devices to be successfully integrated into classroom practice, the teacher must be committed to, and have a deep understanding of the pedagogies with which the ICTs will become a part. In the fourth instance, we have stressed the centrality of the ongoing need for professional learning and support through the development of one-to-one pedagogies and practices of teachers. This professional learning provides both the foundation and challenges to what occurs, and is a significant part of the capacity building of teachers in developing new practices. Finally, but no means lesser in significance to the other factors is the leadership which both drives and grows the shift to one-to-one computing. In this project this has been apparent in many ways.

As stated, there is much learning to be done around the moves towards 1:1 eLearning in schools. This study has contributed significant insight into the possibilities and challenges of innovating with ICTs. There are multiple new directions which can be explored in order to increase the effectiveness and capacities of these technologies within the everyday practices of teachers and learners within schools. If ubiquitous computing is the aim of 1:1 eLearning, there is much to learn from the experiences and participation of the six schools, and their key stakeholders.
REFERENCES

Canberra Times: Feds offer an extra $800m for school computers. (November 28, 2008). *Canberra Times (Australia)*.


