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*Te Tāhuhu o te Mātauranga Aotearoa*



**Laptops for Teachers:  
An evaluation of the TELA scheme  
in Otago schools**

**Report to the Ministry of Education**

**Keryn Pratt, Kwok-Wing Lai & Ann Trewern  
with Fiona Concannon & Harriet Sutton**

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A qualitative evaluation of the  
Digital Horizons Laptops for Teachers Initiative in the Otago Region

# Final Report



A report to the Ministry of Education

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## Executive Summary

This report focuses on the beliefs and practices of teachers with laptops provided by the *Laptops for Teachers Scheme (TELA)*. Data for this report was collected from five rounds of interviews with teachers, ICT coordinators and principals of five Otago schools, carried out between 2005 and 2008. Interviews were used to determine the participants' perspectives pertaining to the current and future use of laptops for teachers in New Zealand primary schools, and the impact of the TELA scheme. Observations of individual classrooms and the use of ICT and the TELA laptops, in particular, were also completed with each of the five schools.

There is no doubt that the laptops provided by the TELA scheme have become an invaluable and everyday part of these teachers' lives. Although in the first round of interviews some teachers felt they could do without their laptops, this changed. In the final round of interviews teachers felt there was no longer any way they could do their jobs without their laptops. The portable and flexible nature of the laptop was seen as its most valuable feature.

School-level factors, such as infrastructure and school culture, seem to have mediated the impact of the TELA scheme as well as teachers' setting of goals and objectives. Leadership appeared particularly important in terms of the impact of the TELA scheme. The role of the principal in providing the necessary infrastructure and support, and in ensuring that ICT was an expected part of the school culture, seemed critical.

The TELA scheme appeared to have the largest impact on teachers' skills, confidence and competence in terms of the use of ICT for administration, preparation and planning. There seemed to be some effect for some teachers, in some schools, in terms of use of ICT in teaching, and in particular in terms of pedagogy but this was less common, and took much longer to occur. In several schools, the initial focus was on upskilling staff, followed by enhancing the use of technology for preparation and administration, with these schools now working on using ICT in teaching and learning. It appears that this process takes time, and the greatest impact occurs when the school and personal factors are both conducive to ICT use.

There seemed to be some change in teachers' beliefs and values about the use of ICT in teaching and learning as a result of the TELA initiative. Generally these were incremental changes, although some teachers reported having a newfound understanding of how ICT could be of value in teaching and learning. Again, school factors seemed to impact on whether or not beliefs changed.

It should be noted that it is difficult to determine the impact of the TELA project as it has not occurred in isolation. Technology use in the world is increasing and schools have been involved in professional development clusters, all of which may have impacted on the use of technology. While there have not been wholesale changes in classroom teaching, the use of ICT in teaching and learning has increased, and it appears the laptop scheme has been an important part of this. Having said that, this research also shows that personal and school factors cannot be overlooked, and must be considered as well.

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# 1. Introduction

In October 2004, a team of researchers at the University of Otago College of Education were contracted by the Ministry of Education to conduct a long-term qualitative evaluation of the impact of primary school teachers' access to laptops as a result of the *Laptops for Teachers Scheme* (TELA)<sup>1</sup>. Parallel independent evaluations are also being conducted by two other research centres in New Zealand, at the University of Waikato (Cowie & Jones, 2005; Cowie et al., 2006; Cowie et al, 2008a, 2008b) and the University of Auckland (Parr & Ward, 2006).

## 1.1 The TELA scheme

The first *ICT Strategy for Schools* document was released by the Ministry of Education in 1998. The goals of this strategy were to build infrastructure and school capability. It was followed in July 2001 by a discussion document (a draft strategy for 2002-2004) (Ministry of Education, 2001) and then in June 2002 by the new strategy: *Digital Horizons: Learning through ICT* (Ministry of Education, 2002). This second strategy focused on the challenge of integrating ICT more fully into curriculum practice. It was replaced in 2006 by the new *e-Learning Action Plan for Schools*. The Laptops for Teachers Scheme is one of a number of projects that fall under the strategic direction of the *Digital Horizons* (2003) strategy.

As an initiative of the Digital Horizons strategy (Ministry of Education, 2003), the Laptop for Teachers Scheme (TELA) began in 2003, replacing the previous provision of Laptops to Secondary School Teachers (STELA) Scheme that had begun in 2002. The TELA scheme extended the STELA project from Years 9 to 13 to include Years 7 and 8 teachers in the 2003/2004 Budget. This was further expanded for Years 4 to 6 in the 2004/2005 Budget, and for Years 1 to 3 teachers in July 2005. Under the scheme, approved applicants would be reimbursed for approximately 2/3 of the costs of leasing a laptop. Schools could choose to pay the remaining 1/3 for their teachers. The participating schools were then additionally obliged to meet the cost over the three years of the lease for the necessary ICT infrastructure, professional development and technical support (Ministry of Education, 2005).

The scheme now applies to all permanent full-time and part-time teachers in state and integrated schools working with Years 1 to 13 classes. The vision behind this initiative was to provide a teaching tool to all teachers, ensuring the development of greater confidence and competence in the use of information and communications technology (ICT).

## 1.2 The current study

This report addresses the following research questions:

- Why do primary teachers participate in the TELA initiative? What are their goals and expectations of laptop use?
  - To what extent does having a set of goals and objectives of laptop use affect how and when teachers use the laptop computers?
- What are the impacts of the TELA initiative on teachers' professional growth and collaboration opportunities, access to, and creation of, quality ICT-based teaching and learning and assessment resources, as well as on their lesson planning, preparation and administration?

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<sup>1</sup> [www.minedu.govt.nz/goto/tela](http://www.minedu.govt.nz/goto/tela)

- Are there any changes of attitudes, beliefs, and values of teachers about the use of ICT in teaching and learning as a result of the TELA initiative?
- What pedagogical approaches do teachers use in their teaching with ICT as a result of an increase in ICT skills and confidence?
- To what extent has the school supported teachers' participation in the TELA initiative, as reflected in the school's ICT and professional development plans?
  - How important is the school and work culture in affecting teachers' laptop use? In what way does the TELA initiative change the culture of the school?
  - What is the role and importance of the school leadership and planning in fostering change?
  - What, if any, additional demands has the TELA initiative placed on schools, in terms of teachers requiring access to the Internet and network from their classrooms and their homes or access to peripherals such as data projectors and printers?

It does this by reporting on five rounds of interviews with teachers, ICT coordinators and principals of five Otago schools, carried out between 2005 and 2008. Interviews were used to determine the participants' perspectives pertaining to the current and future use of laptops for teachers in New Zealand primary schools, and the impact of the TELA scheme.

The report begins by providing some background information with regard to the TELA scheme and the use of ICT in New Zealand, as well as similar national and international projects, in order to provide a context for this evaluation. It then provides information regarding the schools participating in the evaluation, the data collection methods and objectives. The methodology underpinning data collection is then detailed. The findings of the report are discussed, under each of the major probed thematic clusters: school factors, personal factors, and the impact of the laptop. The discussion explores how the impact of the laptop project has been mediated by factors at a school and personal level and summarises answers to the research questions.

## 2. Review of Literature

Internationally, a number of national, state and city agencies and school districts have invested heavily in computers for schools with the twin goals of improving student achievement and preparing students for the new kinds of work and interaction that will be integral to a future world. The scope and variety of interventions include provision of laptops for teachers, provision of computers to students or to teachers and students; nationwide provision to pilot schemes involving only a small number of schools; and interventions that test and trial different types of computers within general or specific contexts. While there are many evaluative studies that assess the impact of these initiatives, the body of evaluative literature available that assesses the impacts and outcomes of teacher laptop schemes is surprisingly limited.

We have not conducted a comprehensive literature review on this area but instead have focused on literature we feel is of direct relevance to this initiative. The literature discussed here comes largely from the United Kingdom, as well as the United States and also New Zealand. The type of literature explored includes evaluative research reports (including other TELA evaluations), summaries of research, assessments of current classroom contexts, conference papers, reviews of research and conceptually-framed articles. This review explores this literature within the context of the research questions that were developed to guide the direction of this evaluation.

Because technology use in educational contexts is invariably linked with student achievement, much of the available research into and critique of technology integration looks specifically at classroom usage and resulting impacts on student learning. Inan and Lowther (2009), researchers involved in the Michigan schools' laptop scheme for students, categorise technology use in the classroom into the three broad areas of instructional preparation, instructional delivery and use as a learning tool. While the categorisation is a useful one, it is limited in its scope in the context of the TELA evaluation. In reality there is much more to teachers' work. An understanding of how technology accentuates student learning continues to evolve. Evaluating the extent, and success or otherwise, of technology integration requires a broader focus that includes the school's culture, organisation, pedagogical approaches and technology. Researchers looking at integration/innovation from a wider perspective have included Kozma (2005) and Mioduser, Nachmias, Tubin, & Forkosh-Baruch (2003). The latter proposed a four dimensional categorisation: time and space configurations; student roles; teachers; and the curriculum. In this research, we looked at the effect of the provision of teacher laptops though exploring school- and personal-level factors that may impact on technology use and integration. This literature review looks at these aspects and at what the literature has to say regarding the impact of ownership on practice, in line with our research questions. This review is augmented by a description of teacher laptop schemes and their key findings (see Appendix A).

### 2.1 The impact of teachers' goals and expectations of technology use on practice

The first area of interest was the extent to which teachers' initial reasons for taking part in the TELA scheme, and their beliefs about the value of technology in a variety of professional work practices, affected their expectations and the way they adopted and integrated the technology into their practice.

#### Why become involved?

To understand what influences school communities or individual teachers to become involved in such schemes has been investigated rarely in reports. The reasons for individual teacher involvement may be quite different from those when whole schools decide to become involved in an initiative. In one pilot, Tablet PCs in Schools (Twining et al, 2005), teachers became involved simply because their school was part of the project. Most schools had become involved because of specific benefits afforded by the technology, such as mobility and the saving of space.

Parr and Ward (2006) asked this question directly of primary teachers and found there were two main reasons given for individual teacher involvement in the New Zealand TELA scheme. In initial surveys, TELA teachers believed that access to a computer was important for their work and that a computer was a valuable tool for teachers. Parr and Ward also found that TELA teachers had quite high pre-expectations that laptop ownership would impact more on administrative work and would be instrumental in improving their personal level of ICT skills, rather than any other specific areas of their work. They felt that there would be less impact of computers in improving academic outcomes for students and on classroom teaching practice. These are expectations that seem reasonable and practical given the contexts in which these teachers were using the technology. These attitudes may reflect policy expectations, where laptops were initially intended for the use of teachers only – not students. A single laptop, without peripherals such as a data projector, has some but overall limited use for instruction. By the end of the first year of this research, these teachers reported that they were somewhat slower in reaching their expectations than they had originally anticipated. In the surveys at this time, teachers reported that the greatest impact of ownership was on improving teachers' level of ICT skills (Parr and Ward, 2006).

### Teachers' goals and expectations for technology use

Again investigations into teachers' initial goals for taking up technology or entering these schemes has been rarely undertaken. In the English Computers for Teachers initiative (BECTA, 2001), teachers were provided with a £500 subsidy by the government to purchase their own computer. When asked why they had bought a computer, the three most commonly cited main reasons were that it would help them improve their ability to use a computer (37%), to prepare teaching materials (21%), and to undertake administrative tasks (14%).

In the New Zealand TELA scheme reports, Cowie et al (2008a) found somewhat similar responses amongst secondary TELA teachers. The main goal for 23% of teachers was to create learning and teaching resources; for 22% of teachers it was to learn about ICT as a tool in teaching; and for 19% learn to use and improve skills. One year later, these percentage responses had changed very little. The goals of teachers at upper primary school levels were slightly different. There was evidence that these teachers' goals were changing and readjusting over time (Cowie et al, 2008b). In 2004, 37% of teachers indicated their goal was to learn more about ICT as a tool in teaching. Over three years of data gathering this increased to 46%. In 2004, 23% of primary teachers wanted to learn to use and improve skills, decreasing to 15% over the three-year period of data gathering, suggesting that some teachers considered they had achieved that particular goal. In 2004, 14% of teachers indicated their goal was to create teaching and learning resources, and this showed a small increase over the three years to 19%.

From the literature on teacher laptop schemes, it appears that initial expectations of the impact appeared to be limited to planning and administrative tasks. A limited number aimed to learn about using ICT as a tool in teaching and improving their ICT skills, but in general teachers' initial expectations for technology use appear to be located within quite limited dimensions.

### To what extent does having a set of goals affect how and when teachers use technology?

How teachers' initial goals and expectations for ICT use are shaped has not been widely investigated. The TELA evaluation reports suggest that for many TELA teachers, goals and expectations may have been shaped by a self-estimation of their ICT abilities, and the school and classroom contexts in which they are working. There is some indication that individual TELA teachers' goals and expectations for laptop usage appear to have been influenced also by national policy expectations (Cowie et al, 2008b) but the level to which this has occurred has not been investigated and remains unclear. It was noted in the published TELA reports that, over time, goals and expectations changed very little for secondary teachers but reasonably substantially for Years 7 and 8 primary teachers, especially in the area of learning how to use technology in the classroom (Cowie et al, 2008a, 2008b). Meeting goals and expectations can also be stalled by the necessity of meeting other more compelling expectations.

That external goals and expectations impact on levels and extent of ICT integration is implied in the literature. Based on findings from their study of technology using schools in the United States, Baylor and Ritchie (2002) claimed that teachers' goals and expectations for ICT integration are shaped by seven factors: planning, leadership, curriculum alignment, professional development, technology use, teachers' openness to change, and teachers' non-school computer use. Schools that are successful in integrating technology into the curriculum are often guided by a comprehensive technology use plan that describes the overall philosophy of technology use and explores how technology will improve teaching and learning. If school leaders are seen to value and use ICT, and promote technology by providing acknowledgements and incentives that reinforce its importance, then they establish expectations that influence its use. Without adequate support, teachers may be unsure of best practices, leading to unclear expectations and an inability to cope with change. External professional development and timely in-school collegial support offers tips, techniques, best practices, and models for classroom implementation, giving teachers the opportunity to learn about and observe new teaching methods, share questions and problems with others and explore new ideas with experts (Baylor & Ritchie, 2002).

## **2.2 Impacts of laptop ownership on teachers**

There is a considerable body of literature now available on the impact of laptops and other forms of portable technology on teachers' personal growth in ICT and collaboration activities. The English initiatives (for example, BECTA, 2001; Kington, Harris, Smith & Hall, 2003) found that personal ownership was a key transformative aspect of laptops. Teachers in all schemes commented that they could keep a great variety of professional work materials in one place without having to carry around various folders. The portability of laptops allowed for ability to work anytime and anyplace and this was also a key feature, allowing teachers to work on their laptops when they were waiting for groups, or take their laptops to other places to work, and work at home at nights and weekends. Having laptops has meant developing intranet spaces to house departmental resources for sharing.

### **Personal growth**

Few studies have investigated progress in personal teacher development in ICT use over time or considered what forms of progress are occurring. The English 'Computers for Teachers' schemes and the laptop initiatives indicated that many teachers made 'resounding' advances in developing skills and confidence in using ICT personally and professionally, particularly in the initial trials (BECTA, 2001; BECTA, 2002). In the later trials, there is evidence of more general trends of improvement. A gradual improvement trend is also noticeable in the New Zealand TELA scheme. Cowie et al (2008a) describe secondary TELA teachers' progress as incremental and accumulative, but also point out that growth can be dependent on factors other than laptop ownership, such as ease of access to the school's network, ease of overcoming technical difficulties and so on. Nevertheless, many teachers in both the English and New Zealand schemes reported that felt they would be lost if their laptop was to be withdrawn.

On an individual basis, TELA teachers' knowledge and expertise in the use of ICT varied considerably. Many of the secondary teachers admitted in interviews that their laptops had not substantially enhanced their knowledge and expertise or their practice. There were exceptions to this, and researchers interviewed teachers who were actively redesigning their teaching and learning programmes to include materials that were current, authentic and multimodal in nature.

### **Collaboration activities**

Many individual TELA secondary teachers reported extensive use of the laptops for email communication with colleagues in other schools for planning joint activities, subject association networking, sharing resources and diffusing new practices. Regardless of its advocates, computer-assisted communication did not appear to be impacted to any great extent by laptop ownership. Two methods of communication were investigated by survey by Cowie et al (2008a): email use and online discussions.

Email use was reasonably well established with TELA secondary teachers prior to the start of the laptop research. Just over half the teachers surveyed routinely used email and one-third of teachers occasionally used email (Cowie et al, 2008a). Virtually no change occurred in the type or amount of email use over time by these secondary teachers. Email use by TELA primary teachers appeared to be higher than for secondary teachers. However, comparisons between the primary and secondary groups is difficult to assess as the research team altered the way the questions were asked of primary teachers for the final year to differentiate ways in which email communication was being used. Primary teachers were using email for a variety of different professional purposes, including emailing parents and students (Cowie et al, 2008b).

Online discussions were not well used by either secondary or primary teachers. Routine participation in discussions actually halved during the data collection period and occasional participation increased moderately for secondary teachers. Primary teachers did increase their participation, but this was only a moderate increase from 16% to 23% of teachers participating.

If laptop ownership has had little overall impact on computer-assisted communication, this is not the case for in-school collaboration. Cowie et al (2008a) report that laptops fitted well with the collaborative work culture of many schools and departments. Two-thirds of secondary teachers were making use of laptops for the collaborative development of units and lesson materials. Secondary focus groups reported that the laptops have led to a significant change in the social practices associated with lesson planning and preparation. They often sat together to collaboratively develop and share lesson materials and student work, and met up with colleagues in cafes and other venues to share and develop ideas. In some schools, there was evidence that departmental spaces had been reorganised to allow teachers to work collaboratively. For TELA primary teachers, there was a noticeable increase in teachers collaboratively developing digital materials over time, from 58% to 82%. Also noticeable was the increased use of the Internet for accessing professional readings, with this type of usage increasing from 69% to 91%.

### **2.3 Access to and creation of quality ICT resources, lesson planning and preparation**

International and local studies have all reported improved access to a greater range of Internet resources and software, with teacher ownership of laptops. Many teachers felt students were advantaged when teachers could access up-to-date and authentic information. Not all teachers were using the technology directly with their classes, but they were able to produce better quality and more relevant curriculum paper resources for their students. Routine use of laptops for preparation of student handouts greatly increased.

Various studies (Cunningham et al, 2004; Cowie et al, 2008a & 2008b) have found that most teachers routinely used their laptops to access other teachers' resources, created resources from Internet sources that could be shared with colleagues, reused resources making slight changes or adapted good resources for use with different subjects and year groups. Teachers reported that with laptops they could produce better, more cost-effective resources themselves, and this was quite motivating (Cunningham et al, 2004; Cowie et al, 2008a & 2008b).

### **2.4 Administration**

Various international and national teacher laptop ownership initiatives have reported positive influences on whole-school management. This can also lead to impacts on teaching and learning. Cowie et al (2008b) found that in schools where administrative systems were digital and all teachers used laptops to contribute to record-keeping, whole-school analysis had become more comprehensive. The implications of whole-school analysis of learning are significant. The ability to more successfully identify gaps in students' learning and individual learning needs is likely to lead to greater personalisation of learning.

## **2.5 Pedagogical approaches**

There is a considerable body of international literature that suggests that the impact of technology on changing instructional approaches has been minimal (Cuban, Kirkpatrick & Peck 2001; ERO, 2005; Ertmer, 2005; Lowther, Ross & Strahl, 2006). Ertmer reports that while the foundations for successful technology integration are now in place in US schools, the most common and frequent uses have resulted in only incremental or first-order changes in teaching style and remain far removed from the best practices advocated. Ertmer also suggests that when considering ways to change teachers' practice, it is impossible to overestimate the influence of teachers' beliefs. In one US middle-school trial where students received laptops, Windschitl and Sahl (2002) describe the process whereby three teachers each developed quite different pedagogical solutions within the same setting. Two of the three case-study teachers explored a more constructivist compatible approach; one succeeded in integrating the laptops into classroom practice but the other (who actually moved much further) had largely abandoned the use of the laptops by the end of the study. Windschitl and Sahl concluded that teachers are more likely to consider and be guided by what is proper and possible in classroom settings than by instructional strategies. While what is proper and possible is shaped by teacher beliefs, it is also shaped by prevailing social dynamics and the institutional culture of the school.

The Scottish report (Simpson & Payne, 2004), a summary derived from three surveys taken over time, suggests that it is difficult to discern any clear impact of ICT on pedagogy. There is evidence of change in the activities teachers and pupils undertake, but whether this means a fundamental change in pedagogical strategies deployed is unclear. There are some excellent examples of good practice in schools where technology has had a fundamental impact on teaching and learning. Simpson and Payne also suggest that over time there has been a discernible change in focus from learning about ICT to learning with the support of, or through, ICT. Many teachers were unsure of how to use ICT for the benefit of students and were looking for guidance.

In the New Zealand context, Schagen and Hipkins (2008) found in national surveys of primary and secondary schools that the use of ICT had increased considerably since 2003. This suggests there has been a gradual change in use since the inception of the TELA laptop scheme into secondary schools in 2003. What the study also found was evidence that teachers held, and expressed, a range of different views about the value of ICT in learning. Cowie et al (2008b) found evidence that the laptop ownership was slowly beginning to expand the learning opportunities, especially in Years 7 and 8, and that laptops had by 2006 begun to influence teaching practices indirectly. Teachers were beginning to take technology into account.

According to Schagen and Hipkins (2008), a majority of primary teachers felt ICT use was an essential and routine aspect of learning, that it was helping students' ICT skill development, and that it made learning more engaging/motivating. It was important to note that for nearly half of the primary teachers, ICT use in their classroom was still only occasional and only for a specific project or purpose. They found that secondary teachers were generally less enthusiastic than their primary counterparts about the benefits of ICT. A lower percentage of secondary teachers said that it was helping ICT skill development and that it made learning more engaging or motivating; almost two-thirds (a higher proportion than primary school teachers) said that their use of ICT was only occasional.

The current assumption is that improvements in teachers' confidence and competence with ICT, access to and support for ICT will eventually see the emergence of constructivist compatible pedagogies and a shift to more student-centred pedagogy. Schagen and Hipkins (2008) report that two-thirds of secondary school respondents in the national surveys felt that better integration of ICT into learning had been achieved and better integration was being considered by most of the rest. They also report that a majority of primary schools had integrated ICT into learning and implemented inquiry learning and thinking skills approaches; nearly all others were considering their introduction. This suggests that in practice there are some moves being made towards more widespread adoption of student-centred pedagogies but that

there may be a raft of strategies that are contributing to this change, of which ICT and TELA teacher laptops may be only a small part. Evidence to date is still inconclusive, although what is clear is that any change takes time.

### Changes in attitudes, beliefs and values

There is some evidence in the literature available, however, that quite wide-ranging change in attitudes, beliefs and values are indeed occurring. One key change evident in almost all the international and national literature on teacher laptop ownership is the streamlining of administrative tasks and school administration processes. The effect of this on teaching and learning and time-space configurations appears to be considerably underestimated in the literature. Significant changes in breadth of curriculum choice and student options are already evident, especially in the senior secondary school. In one emerging new reality, Pullar and Brennan (2008) describe a hybrid senior secondary learning context that involves a mixture of classroom, vocational and distance education modes for students, and the changing teaching styles that occur. Our experience with the schools involved in the OtagoNet videoconference cluster suggest that the case described by Pullar and Brennan is not altogether unique.

While much of the laptop use reported in classrooms tends to confirm that the technology may well be supporting traditional teacher-centred approaches, teachers also reported that they were able to meet a greater range of student learning styles. Cowie, Harlow, and Jones (2006) reported much higher use of laptops by TELA secondary science teachers than by teachers in other curriculum areas. Science teachers used their laptops to stimulate interest and engage students in lessons. They found that laptops facilitated discussion, could be used for generating graphics, for data logging during experiments and to demonstrate concepts or show reactions that would be otherwise difficult to illustrate in the laboratory.

By the end of the TELA evaluation period, some 13% of primary teachers reported that the main benefit of laptop ownership was to 'kick-start' them into thinking about using ICT in the classroom to a greater extent (Cowie et al 2008b). These are not substantial numbers, but Cowie et al suggest there have been observable changes in the learning environments in Years 7 and 8 classrooms as a consequence of teachers having laptops. Particular changes identified are greater connection to the world outside the classroom and increased availability of information to students. Also identified was evidence of group learning work, providing greater flexibility and allowing teachers greater scope to cope with the complexity of learning needs.

## **2.6 The extent and importance of institutional support for progressing teachers' ICT integration**

### Institutional support and work culture

The links between institutional support and work culture and teachers' progress with ICT integration have been explored quite widely. Teacher learning and instructional innovation thrive in environments where there are others who are experimenting with technology. Becker (1994) suggests that teachers "must have access to other people from whom they can learn, either experts who have already mastered the resource or a community of teacher learners who pool their efforts and share exploratory findings" (p. 303). Cowie et al (2008a, 2008b) found much support for this notion from both primary and secondary teachers. Departmental leadership, mentoring and collegial support was vital for TELA secondary teachers. In some secondary schools departmental workspaces were being reorganised to include opportunities for collaborative use of laptops. Principals and more particularly ICT lead teachers were vital supports for primary teachers. The reasons given were the just-in-time nature of any help required, the relevant nature of assistance requested and the sharing of tips and ideas for classroom use.

Windschitl and Sahl (2002) explored the relationship between laptop use and the social dynamics of the setting in which three American middle school teachers were working during the school's implementation of a laptop programme. They noted that, although classroom technology use appeared to be influenced by individual participants' institutionally-



situated beliefs about learners and learning, much of what the teachers actually learned took place in the context of social or professional interactions with others. Many of the interactions that occurred in hallways, during lunchtimes, joint planning periods, meetings, professional development sessions, student interactions, parent-teacher interactions, and conferences, were influential in the creation or revision of mental models for the role of technology in teaching. In other words, these interactions were heavily mediating how technology was being used, and beliefs about what constitutes “good teaching”, within the specific contexts of each institution.

### **School leadership**

The role of leadership in any school change effort has been extensively documented (for example, Fullan, 1992, 2001; Hopkins, Ainscow & West, 1994; Lai, 1999). Although grass-roots initiatives and teacher champions in ICT within a school can be effective, leaders who have ability and vision to direct positive change are believed to be a key factor in settings where embedding technology into learning has been successful. Baylor and Ritchie (2002) suggest that leaders of successful settings not only model technology use, but also plan and articulate their vision, and reward teachers as they strive to incorporate technology. Simply having policies and plans in place does not necessarily mean that teachers will embrace technology integration.

The New Zealand Education Review Office (2005) included an assessment of school leadership in a review of e-Learning in 121 primary schools nationwide, and concluded that 79% of school leaders in the sample were promoting e-Learning effectively. In most schools, governors and principals could describe a coherent vision and rationale, as well as a planned direction for e-Learning which was in turn supported by school policy and planning documentation. The ERO report also found that the schools’ infrastructure supported e-Learning effectively. However, tangible links between schools’ vision and teachers’ classroom practice were not always evident.

In focus group interviews, TELA secondary teachers recognised the importance of school leadership in the form of senior management teams working at the whole-school level and departmental heads that were working at the specific subject level, for progressing the uptake of ICT among the staff of a school (Cowie et al, 2008a). TELA primary teachers did not appear to consider the influence of school leadership in technology adoption and integration as important as many other factors such as ability to network, prompt technical assistance and time to experiment (Cowie et al, 2008b).

### **School networks and technology**

Cuban et al (2001) reported that one of the reasons for limited use of technology in schools was that teachers found the technology unreliable. Ambivalence was expressed about machines that constantly broke down. Even with support services available, technical problems often could not be fixed immediately, or support personnel were overwhelmed by teacher requests. Cuban et al maintain that the cumulative effect of unreliable technology erodes confidence in the worth of the technology and contributes to sustaining current practices. The ERO report (2005) mentions teachers’ concerns about the challenges presented by unreliable ICT equipment and other technical problems. Also mentioned is the challenge for school leaders to maintain sufficient, appropriate, good-quality hardware, and reliable software. Many schools needed ongoing technical support and had experienced unreliable telecommunication links. Many schools were, in general, experiencing problems accommodating ICT.

Technical problems that were believed to impede the progress of some teachers were noted in the first BECTA subsidised ‘Computers for Teachers’ initiative. These included initial and sustained hardware problems, and lack of access to the Internet, exacerbated by logon and password problems, technical issues and little available support (Harrison, Youngman, Bailey, Fisher, Philips, & Restorick, 1998). Under the TELA scheme, schools were required to manage the integration of laptops into the school environment. Cowie et al (2008a) found that teachers identified

infrastructure as a key constraint on their use of the laptops and this dissatisfaction increased over time. This may be an indicator of increased use and developing higher expectations for use.

Laptop use in the secondary classroom appeared to be severely restricted by lack of, or limited access to, school networks (Cowie et al, 2008a). In 2005 only one in every two teachers indicated they had access to the school network and Internet in all the classrooms they taught in, while three-quarters had access in some classrooms they taught in. For primary teachers there was a steady increase over time in the proportion of teachers who could access the Internet from their classrooms. By the end of the study, 83% of teachers had access to an Internet connection in their classroom.

Access to peripherals was an increasing expectation (Cowie et al, 2008a). Just over half of the secondary teachers felt a data projector was important to effective use of a laptop in the classroom. Teachers were not prepared to use electronic resources in the classroom unless they had ongoing access to a data projector. For primary teachers, there was increasingly easy access to printers, data projectors and cameras over time.

Access to technical support improved for primary and intermediate teachers over the three-year period (Cowie et al, 2008b). Support of colleagues was the most frequent action when technical help was needed, an increasing number of teachers reported receiving help from the ICT lead teacher or even a member of the school's computer committee. Access to external support was more important in small schools that did not have technical expertise inhouse.

Any constraining aspects of technology on teacher use appear to be less evident in later reports. The reasons for this are not clear, but it is possible that improvements in infrastructure and technology have resulted in greater stability in hardware and software. Certainly the influence of such schemes on improving school infrastructures and extending access to peripherals appears to be considerable. What is not clear in any of these reports is the extent to which further technology has been purchased to support student learning.

## **2.7 Summary**

What is clear from the literature is that ICT can enhance student learning within traditional curricula subjects and within traditional teaching and learning frameworks. ICT generally has a positive impact on student motivation and has the potential to change both how and what students learn. To date, however, the impact of ICT technologies on education and schools has lagged behind what is possible, and what had been expected. The current research aims to explore this issue further, through an indepth and longitudinal study of the impact of the TELA scheme on five primary schools in Otago.

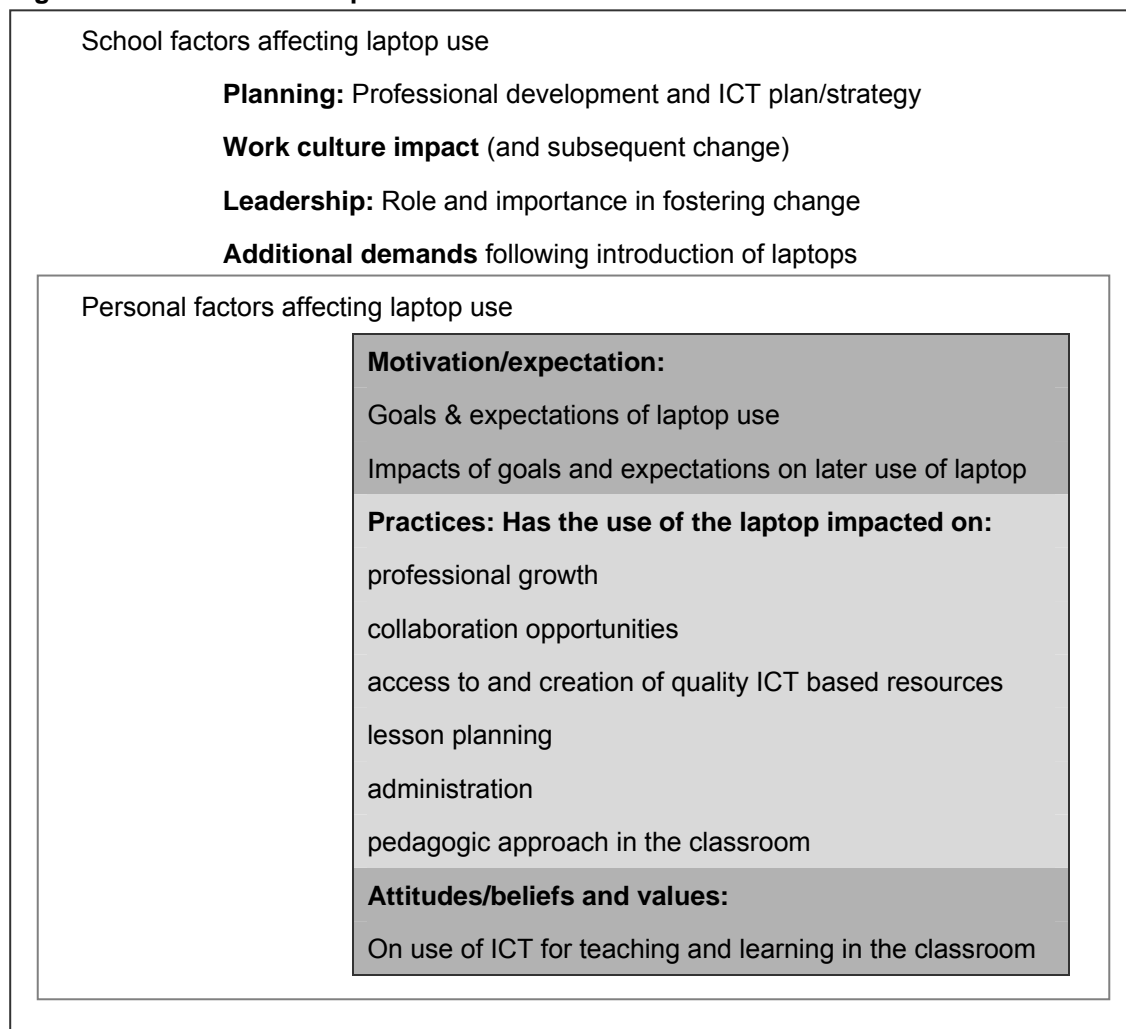
## 3. Method

### 3.1 Objectives

The objective of this case-study evaluation was to explore not only how teachers have used the laptop computers provided to primary school teachers in Otago through the TELA scheme, but also why they have an impact on their professional practice. In broad terms, this evaluation asked about personal factors affecting laptop use, such as teacher goals and expectations of laptop use and how this changed over time. In addition, the impact of the laptop on teachers' professional growth and collaboration opportunities, access to, and creation of quality ICT-based teaching and learning and assessment resources was explored, as well as on their lesson planning, preparation and administration. Attitudes and beliefs of teachers about the use of ICT in teaching and learning as a result of the TELA initiative, and pedagogical approaches they used as a result of the expected increases in ICT skills and confidence, were also examined.

The second area of exploration related to school factors affecting laptop use. In this respect, teachers were asked to what extent the school had and was supporting their participation in the TELA initiative. The importance of work culture and school leadership to promote successful adoption of the technology was explored, along with considerations of the additional demands such as access to the Internet or to peripheral devices at home or at school. All of these issues are illustrated graphically in Figure 1.

**Figure 1: Broad research questions addressed in this evaluation**



The objective of the current evaluation is to provide more detailed information about the impact of the scheme on individual teachers and at a school level through the examination of the 93 individual interviews conducted in five rounds between 2005 and 2008. Reference will also be made to information gathered from six focus group interviews conducted at three schools in rounds three, four and five, and from observations made in 38 classrooms in rounds three, four and five.

### **3.2 Research design**

The methodology adopted in this evaluation is of an instrumental, collective, case-study approach to collect data from a range of stakeholders (teachers, principals and ICT coordinators) to evaluate the success of the TELA initiative. Instrumental case studies focus on an issue or issues (Stake, 1995), and as such, this case was instrumental as it centred its examination on the TELA scheme's impact in the schools. Collective case studies involve more than one case or instrument, and in this instance, five schools or cases were involved. A three-year longitudinal approach has been adopted in this study to capture the change in the laptop use over time, and the long-term effects this use has on teaching (Appendix B details the timeline of the evaluation project).

### **3.3 Participant information: Schools**

Initially, three schools were invited to participate in the research. In 2006, this was expanded to five, as the TELA scheme was extended to all levels of primary school teachers. This resulted in five schools participating in the study. At the beginning of the research, the numbers of teachers per school who gave their consent to participate in this evaluation ranged from two to seven. In addition, the principal and ICT coordinator of each school agreed to participate. These participants were invited to take part in individual interviews throughout the period of the study, but the number decreased over time owing to teachers leaving their positions. In addition, all other teachers at these schools were invited to participate in focus group interviews at various times throughout the research.

Schools that were invited to participate in a large-scale study of the TELA scheme by the Waikato research team were excluded from this study. Three criteria were used to select schools from those remaining:

- information from the Ministry of Education on the uptake of the TELA scheme in schools within the Otago region. Schools that had a higher proportion of teachers participating in the TELA scheme were given priority, as were schools that had only recently joined the scheme
- location – the research team classified the schools as rural, provincial or urban (see Appendix C) and sought two urban schools, two provincial schools and one rural school
- school type (a mix of contributing and full primary schools).

Taking these criteria into account, the sample was narrowed, and schools were invited to participate. Those schools that responded and agreed to participate then became the purposive sample.

The research team was faced with a degree of difficulty in obtaining five schools to participate in the evaluation. This was initially owing to the limited number of the schools in the region that had only just received their laptops in May 2005 when the evaluation project first began. Hence, there were only a small number of schools eligible for the purposive sample. Secondly, time restrictions, pressures on teachers, and their participation in other projects (for example, the ICT Professional Development Clusters) that were perceived to be seeking comparable information, acted as barriers to schools taking part. Thirdly, the lack of a tangible incentive or reward was also cited by schools as a reason to decline the invitation to become involved in this evaluation.

However, the schools that agreed to take part in the evaluation gave willingly of their time. Several teachers sacrificed their lunch period to participate. Others gave time after school, occasionally waiting until after five o'clock for an interview session. One of the teachers visited the university to participate in an interview on a public holiday. In another school, the teachers coordinated cover for each other's classes whilst the interviews took place. All in all, the participating schools and teachers were extremely generous in efforts to take part in interviews and in all later communications.

Table 1 provides an overview of each of the participating schools. A synopsis of each school follows.

**Table 1: Participant school information**

School	Type	Decile	Location	Roll*	Staff**
A	Contributing	5	Urban	400	20
B	Full primary	7	Rural	250	10
C	Full primary	10	Provincial	150	10
D	Contributing	10	Urban	200	10
E	Full Primary	7	Provincial	350	20

\* Rounded to the nearest 50 to preserve anonymity

\*\* Rounded to the nearest 5 to preserve anonymity

### School A

School A is a contributing primary school, classified by the research team as an urban school. The school is a co-educational state school with a roll of between 350 and 400 students. Two members of the research team conducted a preliminary school visit to discuss the project with staff at the school in 2005. The school agreed to take part, and information packs were distributed to the teachers who were participating in the laptop scheme. Although two teachers initially agreed to participate in the evaluation, they were unable to be interviewed in 2005. In April 2006, the school was again contacted, and interviews were carried out with the principal, the lead ICT teacher and two additional teachers. In November 2006, two teachers participated in interviews, while two focus group interviews were conducted, owing to 12 teachers wishing to be involved in the focus group interviews. The large number of teachers involved in the focus group interviews may have been simply a function of the relatively large number of teachers at the school and the limited number who were taking part in the individual interviews. Observations were also conducted in three classrooms. In the fourth round of interviews (October 2007), the principal, ICT coordinator and one teacher participated in interviews, while a focus group interview was conducted with a further six teachers. Observations were conducted in two classrooms. In the final round of interviews, only the principal and one teacher were interviewed, as the other teacher and the ICT coordinator had both left the school. Observations were carried out in the teacher's classroom. No additional teachers wished to participate in focus group interviews.

### School B

School B is a full primary school, classified by the research team as being a rural school. The school is a co-educational state school, with a roll of between 235 and 285 students. Two members of the research team conducted a preliminary school visit to discuss the project with staff at the school in 2005. This was followed by a visit by one member of the research team to conduct face-to-face interviews in June 2005 with five staff members. At the time of this first round of interviews, the school had undergone leadership changes and, as a result, the principal did not participate in the initial stage of interviewing. The second round of interviews took place in May 2006. At this stage, the principal was interviewed, along with the ICT lead teacher of the senior syndicate and four other teachers. In the third round of interviews, conducted in November 2006, four teachers participated in individual interviews, while one focus group

interview was conducted with four teachers. Observations were conducted with two classes. In October 2007, the fourth round of interviews was conducted with the principal, ICT coordinator and two teachers. In addition, two focus group interviews were conducted, one with five teachers from the junior syndicate and one with two teachers from the senior syndicate. Observations were conducted in two classrooms. In the final round of interviews, the principal, ICT coordinator and one teacher were interviewed. The other teacher interviewed at round four was on study leave and unable to be interviewed. Observations were carried out in one teacher's classroom, but no focus group interviews were conducted.

### **School C**

School C is a full primary school, classified by the research team as a provincial school. The school is a co-educational integrated school, with a roll of between 125 and 175. In agreement, and after discussions with the principal at the school, the research team determined that a preliminary visit was not necessary. A member of the team conducted face-to-face interviews in May 2005. Interviews took place with the principal, the ICT syndicate lead teacher and two other teachers. The school was contacted again and a second round of interviews took place in May 2006. In this second round of interviews, a single research member again carried out interviews with the same principal, the same teachers and an additional three teachers, two of whom had joined the school in the past six months. Five teachers participated in the third round of interviews, conducted in November/December 2006. No focus group interview was conducted at this school, as almost all teachers at the school were already involved in the individual interviews being conducted as part of the research, while six classes were observed. In round four (October 2007), interviews were conducted with the principal, ICT coordinator and five teachers, while observations were conducted in six classrooms. The final round of interviews in late 2008 involved the principal and four teachers. The other teacher interviewed at round four had left the school, as had the ICT coordinator. Observations were unable to be carried out at the school and no focus group interview was conducted.

### **School D**

School D was one of two additional schools approached in 2006 owing to the expansion of the evaluation after the TELA scheme was widened to include Years 1 to 3 teachers. As such, it was not part of the first round of interviews that took place in 2005. The school is a contributing primary school, classified by the research team as being an urban school. The school is a co-educational state school, with a roll of between 150 and 200 students. The school was contacted by email and phone. This was followed by a visit by one member of the research team to conduct face-to-face interviews with the principal, the ICT lead teacher and two other teachers who had laptops. In November/December 2006, interviews were conducted with two teachers and a focus group interview was conducted with three teachers. Three classrooms were observed at School D. Conducted in October 2007, the fourth round of interviews involved the principal, ICT coordinator and one teacher. Two classes were observed and one focus group (with three teachers) was conducted. In late 2008, the principal and one teacher were interviewed. The ICT coordinator was not interviewed, as she no longer held the position, however, a focus group interview was conducted, with five teachers involved.

### **School E**

School E was the other additional school approached in 2006 owing to the expansion of the evaluation project after the TELA scheme was widened to include Years 1 to 3 teachers. The school is a full primary school, classified by the research team as being a provincial school. The school is a co-educational state school with a roll of between 300 and 350 students. The school was contacted by email and phone. This was followed by a visit by one member of the research team to conduct face-to-face interviews with the principal, the ICT lead teacher and five other teachers who also had laptops. In November/December 2006, interviews were conducted with five teachers. No focus group interview was conducted at this school, as no other teachers wished to participate. Six classrooms were observed at School E. The fourth round of interviews, conducted in October 2007, involved the principal, ICT coordinator and three

teachers. Observations were conducted in four classrooms but no teachers wished to participate in focus group interviews. In the final round of interviews, the principal and three teachers were interviewed at School E. One of these teachers had previously been the ICT coordinator, but she had given up this position. No staff wished to take part in focus group interviews.

### 3.4 Participant information: Individuals

A total of 29 people (five principals, six ICT coordinators and 18 teachers) took part in individual interviews as part of this research. The number of participants decreased over the course of the research, as teachers left participating schools. A summary of those involved and their participation in each round of the research is presented in the following table. Whilst the sample size for these observations is small, it allows for the exploration of some of the characteristics of this purposive sample and for the consideration of some general trends that arose in the interviews.

As this table shows, six male and 23 female teachers participated in the research. At the time of their first interview they had a range of teaching experience (3–37 years) and taught at a range of levels (Year 1 to Year 8).

**Table 2: Details of those who participated at each round of the research**

Round	Interviewed					Gender	Teaching Time	Teaching level
	1	2	3	4	5			
<i>School A</i>								
Principal		Y		Y	Y	Male		N/A
ICT coordinator		Y		Y		Female	5 yrs	Year 2
Teacher		Y	Y	Y	Y	Female	17 yrs	Year 6
Teacher		Y	Y			Female	6 yrs	Years 3-4
<i>School B</i>								
Principal		Y		Y	Y	Female		N/A
ICT coordinator		Y		Y	Y	Female	6 yrs	Year 5
Teacher	Y	Y	Y			Female	7 yrs	Years 2-3
Teacher	Y	Y	Y	Y	Y	Male		Year 8
Teacher	Y	Y	Y			Female	10 yrs	Years 6 & 7
Teacher	Y	Y	Y	Y		Female	12 yrs	Year 6
ICT coordinator	Y					Male	37 yrs	Years 2-3
<i>School C</i>								
Principal	Y	Y		Y	Y	Female		N/A
ICT coordinator	Y	Y		Y		Female	13 yrs	Years 7 & 8
Teacher		Y	Y	Y		Female	10 yrs	Years 4 & 5
Teacher		Y	Y	Y	Y	Female		Year 1
Teacher		Y	Y	Y	Y	Female	30 yrs	Years 2-3
Teacher	Y	Y	Y	Y	Y	Female		
Teacher	Y	Y	Y	Y	Y	Female	7 yrs	Years 3-4

**Table 2: Details of those who participated at each round of the research - *continued***

Round	Interviewed					Gender	Teaching Time	Teaching level
	1	2	3	4	5			
<i>School D</i>								
Principal	n/a	Y	Y	Y	Y	Male		N/A
ICT coordinator	n/a	Y		Y		Female	19 yrs	Year 6
Teacher	n/a	Y	Y			Female	27 yrs	Years 3-4
Teacher	n/a	Y	Y	Y	Y	Female	7 Yrs	Year 1
<i>School E</i>								
Principal	n/a	Y		Y	Y	Male		N/A
ICT coordinator	n/a	Y		Y	Y	Female		Years 2-3
Teacher	n/a	Y	Y	Y	Y	Female	6 yrs	Year 4
Teacher	n/a	Y	Y			Female	3 yrs	Years 1 & 2
Teacher	n/a	Y	Y			Male	5 yrs	Years 5 & 6
Teacher	n/a	Y	Y	Y	Y	Female	29 yrs	Years 7 & 8
Teacher	n/a	Y	Y	Y		Female		Year 1
<b>Total interviews</b>	<b>9</b>	<b>28</b>	<b>18</b>	<b>22</b>	<b>16</b>			

### 3.5 Data collection procedures

Multiple data collection methods were employed in this evaluation to allow for triangulation. These included:

- semi-structured interviews
- needs assessment (Goals and objective statements)
- class observations
- focus group meetings.

An overview of the research timeline, and when each type of method was employed, can be found in Table 3.

**Table 3: Overview of the research timeline**

		Round 1	Round 2	Round 3	Round 4	Round 5
<i>Interviews</i>	Teachers	mid 2005	mid 2006	late 2006	late 2007	late 2008
	ICT coordinators	mid 2005	mid 2006		late 2007	late 2008
	Principals	mid 2005	mid 2006		late 2007	late 2008
<i>Goals &amp; objective questionnaires</i>			mid 2006			
<i>Class observations</i>				late 2006	late 2007	late 2008
<i>Focus group interviews</i>				late 2006	late 2007	late 2008

Semi-structured interviews were conducted with up to five teachers in each of the five participating case-study schools. The intention was to interview participating teachers four or five times throughout the lifecycle of the evaluation project, although this was not always possible owing to teachers leaving the participating schools. Principals and ICT



coordinators were interviewed at least three times, at the beginning of the first year, and at the end of the third year and fourth years. The interviews covered both personal and school factors affecting laptop use (see Appendix D for the themes and open-ended questions that served as a guideline for the researchers).

In rounds one and two, a needs assessment was conducted with teachers participating in the individual interviews, collecting information on teachers' goals and objectives (see Appendix E for an example). Teachers were provided with the form during the interview sessions, and were asked to reflect on and complete it. This was then to be posted back to the research team, to be kept on file for discussion and revision during the subsequent interviews with the teachers. After the second round of interviews teachers were asked about their goals and objectives rather than being given a form, owing to the low response rate in the first two rounds.

Classroom observations were also conducted in the classrooms of willing teachers as part of rounds three, four and five of data collection to gain information on classroom ICT practices. Information gained from the observations was used to help in our analysis and interpretation of transcripts. These observations took place in a range of classrooms and subjects within each of the five schools.

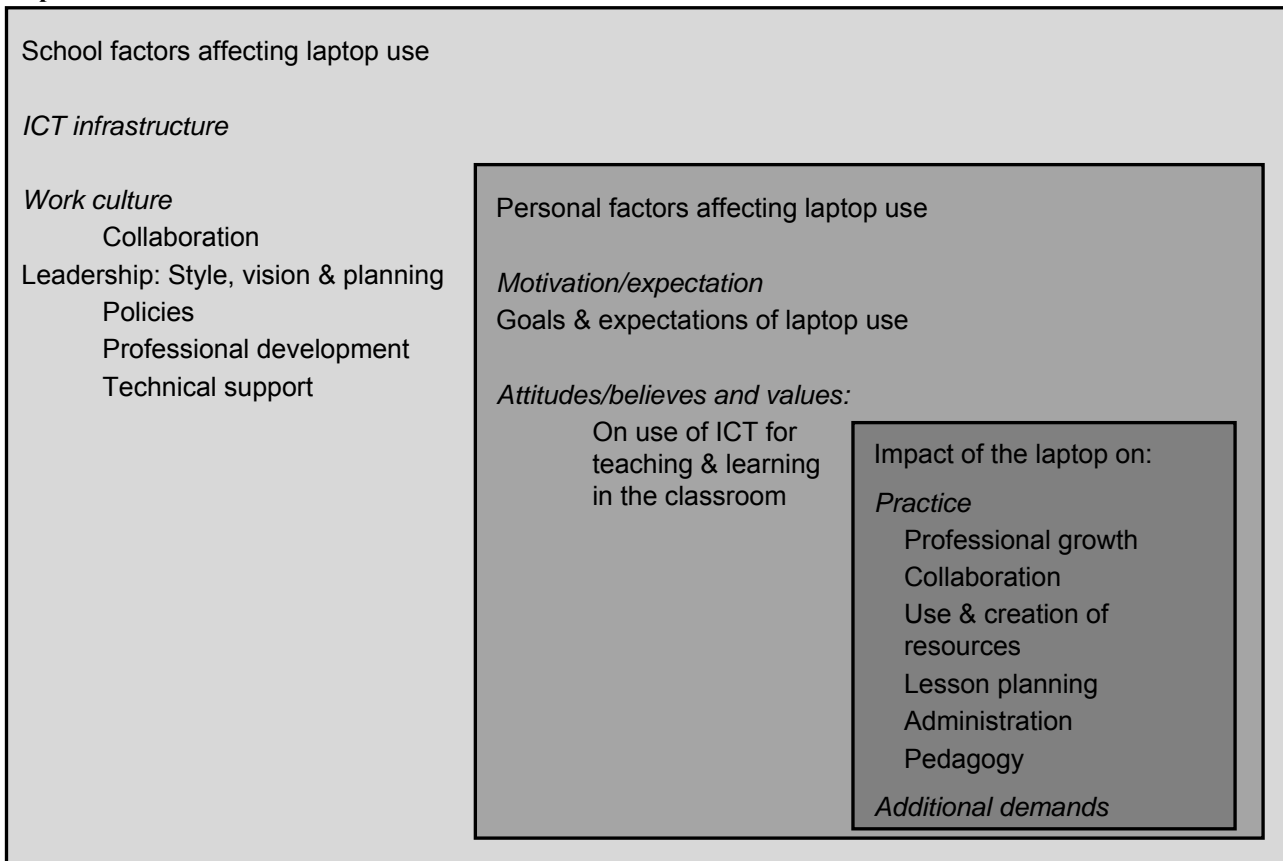
As part of the third, fourth and fifth rounds of data collection, focus group interviews were also conducted. Focus groups provided an opportunity for teachers within the case-study schools who were not participating in the individual interviews to give their opinion on matters pertaining to the TELA initiative. The focus group interviews were semi-structured and covered similar areas to the individual interviews (see Appendix F for the questions that served as a guideline for the researchers). Data from these interviews was compared with the personal interview data. The information gained from these interviews was in line with that gained from the individual interviews, so has been included in the general findings sections rather than discussed separately.

### 3.6 Data analysis

The individual and focus group interviews were transcribed, coded and analysed to identify factors affecting laptop use and changes of pedagogical approaches. The unit of analysis selected for coding constituted a ‘unit of meaning’ after Chi (1997). The data was coded in line with a priority of factors that arose from the research questions; however, these categories were adapted in light of participants’ responses. The graphical representation of the research questions was also adapted, with the new version shown below. This version arose from analysis of the transcripts and is used to present this analysis.

**Figure 2: Adapted version of broad research questions addressed in this evaluation**

**Impact of the TELA scheme**



## 4. School factors affecting laptop use

This next two sections of the report will explore the factors that impact on the level and type of effect the scheme has had. In doing this, they will follow the diagrammatic representation of the research questions and issues that arose from the research (as previously shown in Figure 2). This section will explore the school-level factors that have affected the impact of the TELA scheme, and the following section will look at the personal factors. Changes over time will be identified.

From the literature and the analysis of comments made by participants, it was apparent that the school-level factors that impacted on the TELA scheme could be placed in one of two categories: ICT infrastructure, and work culture. Each of these will be considered in turn.

### 4.1 ICT infrastructure

Without the physical infrastructure in place, such as broadband, adequate computing facilities for teachers and students, and a reliable network, it will be difficult for the cultural climate of the school to be receptive towards ICT. These schools had varying levels of ICT infrastructure at the onset of this research, with these differences largely continuing throughout the project. Table 4 illustrates some of the major differences with respect to several key aspects of the technological resources available within the school, and compares their levels of resources at the beginning of the project (2006) to at the end (late 2008).

Even at the start of the research project, School A had advanced levels of ICT available. Each room had at least two computers, while the school also had a pod and a computer laboratory available for use. All the computers were networked, and a wireless connection could be used with the TELA laptops. Data projectors were available for use within the school, and teachers were able to share resources via a school server and intranet. At the end of the project, School A continued to have advanced levels of ICT. They still chose not to have interactive whiteboards, although this was something they were considering, and had now made the full functionality of the school intranet available offsite. The school used Apple computers exclusively throughout the entire period of the research project.

There had been considerable underinvestment in ICT in School B in the years prior to the research project, so that while all classrooms contained a computer, several of the teachers reported that they did not use it, owing to the poor standard of the equipment. The hardware was, however, in the process of being upgraded. Throughout the project, classroom access to computers remained limited, with generally only one computer per room. This was augmented, though, by access to a central laboratory.

**Table 4: Comparison of the level of attainment of physical resources and network infrastructure**

Level	Category	School A		School B		School C		School D		School E	
		initial	end	initial	end	initial	end	initial	end	initial	end
<i>Location of computers</i>											
Initial	All classrooms contain a computer.	■	■	■	■	■	■	■	■	■	■
Intermediate	Two or more computers are located in each classroom.	■	■	□	□	■	■	■	□	■	■
Advanced	At least one pod of mobile computers is available.	■	■	□	□	□	□	□	■	□	□
Advanced	School has a central computer laboratory.	■	■	■	■	□	□	□	□	□	□
<i>Networking</i>											
Initial	Some computers are networked.	■	■	■	■	■	■	■	■	■	■
Intermediate	All computers are networked and have Internet access.	■	■	■	■	■	■	■	■	■	■
Advanced	TELA laptops are networked and have Internet access.	■	■	■	■	■	■	■	■	□	■
<i>Internet connection</i>											
Initial	Internet connection to at least some computers.	■	■	■	■	■	■	■	■	■	■
Intermediate	Internet connections to all computers via broadband cable.	■	■	■	■	■	■	□	■	■	■
Advanced	School has a wireless network.	■	■	□	■	■	■	□	■	□	□
<i>Peripherals</i>											
Initial	Desktop computers and printers are available.	■	■	■	■	■	■	■	■	■	■
Intermediate	Digital camera(s) are used for project and website work.	■	■	■	■	■	■	■	■	■	■
Advanced	More than one data projector is in use.	■	■	■	■	■	■	□	□	■	■
Advanced	More than one interactive whiteboard(s) is in use.	□	□	□	■	■	■	□	□	□	□
<i>Information transfer</i>											
Initial	School allows teacher to share documents via a central sever.	■	■	■	■	■	■	■	■	■	■
Intermediate	School has a website and intranet, maintained by principal.	■	■	□	□	□	■	■	■	□	□
Advanced	School intranet is maintained by teachers and/or students.	■	■	□	□	□	□	□	□	□	□
Advanced	School intranet can be accessed offsite.	□	■	□	□	□	□	□	□	□	□

Key: ■ = Level attained; □ = Level not attained;

Initially all computers, including the TELA laptops, had access to the Internet via broadband cable. A wireless network was put in place during the period of the research project. There were problems with the signal strength of this network initially; however, the problems were being addressed and had been largely alleviated by the end. Teachers shared work by means of a central server, with no intranet available at any time during the project. By the final round of interviews, this school had also invested in four interactive whiteboards, with a view to purchasing more.

School C was the only school to have interactive whiteboards at the start of the project, and they continued to add to these over the course of the project. Throughout the project these were augmented in each classroom by at least two computers. All computers, and the TELA laptops, had access to the Internet via broadband cable or wireless connections over the course of the project. Initially, teachers shared resources via a central server; however, by the end of the project the principal had implemented a school website and intranet which made collaboration simpler.

At the start of this research project, School D had only a dial-up connection to the Internet. By the end of the project, this had been upgraded and all computers and laptops had broadband access to the Internet via cable or wireless. Access to computers in classrooms decreased in this school over the course of the project; however, this was owing to the decision to focus on providing pods of computers rather than computers in each room. This decision was partly owing to a lack of space in classrooms to add additional desktops. This school had made the deliberate decision to go cross-platform, having pods of PC and Apple computers available. The school had only one data projector, which could be borrowed, although it was looking into purchasing more, as well as purchasing interactive whiteboards. The school had also developed an intranet over the course of the project and was using this to enhance collaboration.

During the initial interviews, several teachers at School E reported that the school had “gone backwards” with respect to ICT owing to changes in how decisions were made with regard to purchasing equipment, and the network infrastructure itself. They did have at least two computers in each classroom, but while these had broadband Internet access, the laptops had no access to the Internet, or to the school network. Teachers could use their classroom computers to share work via a central server, however. The school did have digital cameras and data projectors available for staff to use, but as these were housed centrally, staff reported that they did not make much use of them, as their use had to be planned. By the end of the project, the main change was that teachers were in the process of being able to connect to the Internet using their laptops, although this was not available wirelessly. This was owing to resistance from the Board, who had received technical advice against it. Teachers were now able to connect to the central server for administration; however, there was no school intranet. The school continued to have problems with the reliability and maintenance of their network. The number of computers in classrooms had actually decreased, as older computers were removed when the network was upgraded.

Overall, it can be seen that initially School A was well ahead of the other schools in terms of the ICT hardware and infrastructure available. School A continued to lead the others, however, the other schools all improved over the course of the project. Networking and wireless access were the most common areas of improvement, although the variation in changes seen showed how the schools chose to focus on different areas.

## 4.2 Work culture

The school culture is an important determinant of how successfully the school can develop ICT that is used to enhance learning in the school’s own context, and how changes will be adopted. This culture is shaped by its history, context and the people in it (Stoll, 1998). Each school has a different reality or mindset of school life, often captured in the simple phrase “*the way we do things around here*”. Therefore, their solutions to particular problems will be situationally specific, and no solution will work in every school because of the variety and contextual differences that exist between schools.

However, in general terms for a school to use ICT effectively, the school must broadly possess a culture that incorporates a strong belief that using ICT can help students to learn, increase the efficiency of day-to-day activities within the school and generally improve the school's performance. Without this receptive culture, efforts by individual teachers will be piecemeal, unrecognised and unlikely to become widespread throughout the school.

Most teachers commented that the work culture was generally good, with it being described in terms such as professional (Teacher, School A), strong (Teacher, School A), dedicated (Teacher, School B), fantastic (Teacher, School C), excellent (Teacher, School C) and tight-knit (Teacher, School E).

Participants from Schools A-D used similar words to describe the general work culture of their school, identifying it as being "*supportive*" and "*collaborative*". In contrast, it was difficult to gain an understanding of the work culture in School E, as no coherent picture was presented. Although the work culture was described as being supportive by two staff members, three other staff members said it was not at all supportive. Historically, the school functioned as separate syndicates, which was something the principal wished to overcome, although staff did not feel that this had yet occurred.

The leadership, from management or from teachers, the vision, information sharing, planning and processes illustrate the types of culture that exist within these schools. In this section, we will explore the work culture of the five schools, looking firstly at their collaborative practices, followed by their leadership style and vision, then at the school's policies, and the provision of professional development and technical support.

### Collaboration

A key aspect of work culture of interest in this research was that of collaboration. We were interested in the degree and kinds of collaboration: how these impacted on the implementation of the TELA scheme and how in turn the TELA scheme impacted on collaboration (see further Section 6.2). This included how and to what degree they communicated with one another, the level of sharing of resources and planning, and whether or not team teaching occurred. As described previously, most teachers reported that their schools were collaborative, with this manifesting itself in informal ways, such as through teachers supporting each other, asking and answering questions, and sharing resources. Planning together was less common, and no teachers reported team teaching.

### School A

From their first interviews (round 2), School A teachers reported that collaboration was a key part of the school culture. This collaboration included the sharing of resources, using technology. Teamwork was common, and there seemed to be an acceptance of each person as having different strengths and experiences, and a focus on making best use of these.

### School B

Like teachers in School A, those in School B felt the work culture in their school was supportive and collaborative throughout the research project. They felt that using ICT encouraged collaboration, as "*with ICT, the best model is if someone actually does it in their classroom and then talks about it*".

### School C

Collaboration and open communication was also a characteristic of School C, with it seen as having a positive atmosphere. Teachers supported each other in their use of ICT, and in round one commented on how students at the school also provided informal support for the teachers.

## School D

School D, again, had a positive and collaborative work culture, with this perceived to have improved over the first year of the research, and several years prior to this. At the beginning of this research, School D's collaboration occurred primarily in a face-to-face setting, although they were developing an intranet to enhance collaboration and communication. In the first round of interviews, the principal noted that teachers were only beginning to engage with technology as a vehicle for working collectively.

## School E

In contrast to Schools A-D, the work culture in School E was difficult to determine. As mentioned previously, the staff interviewed for the research had different views of the work culture. One of the issues appeared to be that the school tended to function at a syndicate rather than school level, something the principal was working to change. There did appear to be collaboration occurring within syndicates; however, there were different views on the level of collaboration and of people's willingness to support each other. In addition, the principal explained that the school had a history of "*some dysfunctionality amongst the principal [himself] and the staff*", something that was also apparent from teachers' comments. However differences apparent in the early rounds appeared to be lessening in the final round.

The use of the TELA laptops and ICT in general for collaboration and communication was problematic. Teachers were unable to connect their laptops to the Internet at school, instead using classroom computers for this purpose. Perhaps as a result, emails were largely principal-teachers, with teachers not emailing each other.

There was a clear difference between Schools A-D and School E in terms of the level and kind of collaboration that occurred. While some teachers at all schools believed there was a high level of collaboration, this was not unanimous at School E.

### Leadership: Style, vision & planning

The literature consistently talks about the importance of leadership in terms of the integration of ICT in teaching and learning (Becta, 2002; Lai, 1999). Leadership is needed to provide a vision and develop a work culture around using ICT (Lai, Trewern, & Pratt, 2002). The five schools in this research project had very different models of leadership.

## School A

School A had a very strong leader, who was very interested in ICT and promoted it within his school. He did not lead alone, however, with an ICT coordinator and key people in each syndicate also playing a leading role. He nurtured leadership in other teachers, empowering them to bring about change, rather than them always relying on him. As one teacher commented, "we see leadership as not always residing in the people with the leadership badges, but leadership from anyone who's got a strength in any area". There was agreement amongst staff with his view of his leadership, and the role it played in terms of ICT use in the school. The leadership model in this school, and the views of teachers of this leadership, remained unchanged over the course of the project, with all staff seeing it as "excellent".

The principal provided hands-on support for technology, through just-in-time technical support and professional development, as well as demonstrating skills, identifying and sharing resources, and discussing how ICT could be used in teaching and learning. He came into the school when it had very little technology, and his belief that it could make a difference in teaching and learning has driven the change. While he held this belief, he also felt it was important to be reflecting on the direction the school was going, and looking forward and back while considering an endpoint, to ensure that the right decisions were being made.

Both the principal and the teachers in this school saw the leadership role played by the principal as very important. He and his staff agreed that having the principal involved helped create the expectation that ICT would be used. The

principal not only expected his teachers to use ICT, but modelled its use, while the just-in-time technical support and professional development he provided was seen by teachers as very important to their use of technology.

All participants from School A saw their school as having a work culture that involved ICT. There was an expectation that ICT would be used in everyday life, for teaching, learning and administration. This was apparent throughout the research project. The culture of this school reflected ICT being a part of children's reality, and it being their *"responsibility that we harness that for the best learning that we can offer and the best engagement levels that we can offer"*.

### **School B**

The leadership at this school changed as the project began. When the first round of interviews were done in late 2005 there was an acting principal, with a new principal due to start in 2006. Some problems arose during this interim period but by late 2006 the new principal was dealing with these. The leadership style of this principal was quite consultative and democratic, although there were several changes to how things had been done during the early stages of the project. As she started, the previous ICT coordinator left, so she implemented two new roles: teachers in charge of ICT for each of Years 1-4 and Years 5-8. Teacher perceptions of the new leadership at the school were positive. By 2007, the leadership group at this school had changed slightly, to incorporate an ICT coordinator from one syndicate and a lead teacher from the other, rather than two lead teachers as previously. The principal's role was one of *"generally overseeing"* while the ICT coordinator was responsible for developing the ICT plan for the school, and, along with the lead teacher, was responsible for most of the professional development. Initially, staff seemed to feel this was an effective leadership strategy, although in the later stages of the project there were comments that more leadership was needed.

School B was working towards having ICT as an integral part of their school culture. While its use was expected, the level of use was still varied, something they are continuing to work on. In earlier rounds, School B had a number of staff who were resistant towards ICT, and it had taken time to overcome this resistance and make ICT an integral part of every aspect of the school. Initially, the principal created expectations for using ICT for administrative purposes within the school. Each year she continued to create expectations for using ICT, through mandating its use to work towards a coherent work culture. By the final round of interviews, the principal felt she had been able to shift in her role from *"getting everyone up to speed"* to be more visionary, about where and how she would like ICT to be used in all aspects of the school. She felt there was still a way to go in terms of the teachers' skills, but recognised they had *"come a long way"*.

Staff interviewed generally agreed with the approach taken by the principal, commenting that the expectations set by management were important to provide direction for the laptops to be used successfully within the school. In the later rounds, though, one teacher noted that although the principal encouraged ICT use she did not check it was being used as was expected. Staff felt that the principal herself, although computer literate in terms of her everyday work, was relatively new to the use of ICT. The principal also acknowledged this, saying she had set herself the task of learning a new software application each year (for example, PowerPoint, Publisher, Excel).

### **School C**

School C also took a group approach to leadership. The principal explained that strong leadership is needed, but that *"shared expertise was good"*. She was driving it and *"ensuring we've got the money and resources, and trying to keep up with it"*, supported by the ICT coordinator, the ICTPD cluster lead teacher and other members of the senior management team. She felt her leadership was *"important [as] obviously if I didn't care about it, or didn't think it had any value, it wouldn't happen"*. Staff at this school generally agreed with the principal and ICT coordinator's description of their roles, and felt that the leadership they provided was *"good"*, although one teacher felt no leadership



had been provided with regard to the TELA scheme. Their participation in an ICTPD contract also meant that this was also perceived as providing leadership, with teachers varying in whether or not they felt the principal and school-based support or the ICTPD contract provided more leadership.

The principal of School C provided a small amount of on the spot technical support, but saw her role more in terms of driving its availability and use. She frequently sent emails to staff sharing resources, and was seen as supportive in terms of providing necessary resources and professional development. She modelled the use of ICT, using an interactive whiteboard during staff meetings and a computer when working with staff. Her role was described as supporting and encouraging, rather than enforcing.

ICT was perceived as being part of work culture in School C, and seen as “*an essential tool*” by the principal and the board, something that was recognised by teachers, as a School C teacher explained: “*It’s the school. It’s what we do here . . . There’s no choice, it’s what you do*”. While ICT was part of the school culture, the principal recognised that staff were at different levels and progressing at different rates. As long as they were progressing, however, she was happy.

### **School D**

Like School B, School D had a recent change of principal at the start of the project. He saw his role as having two aspects: “*helping to keep things going, but also, being one of the pushers to promote the use of ICT in the classrooms as well*”. By 2007, the school was participating in an ICTPD cluster. This cluster provided much of the leadership in terms of ICT, with the ICT coordinator working within the school to liaise and coordinate between the school and the cluster. The principal and deputy principal, however, still played a leadership role in promoting ICT throughout the school. Teachers were generally happy with the leadership in School D, although some felt more could have been done. The principal felt his leadership role was critical, as you need “*to have someone pushing [ICT use] along*”.

At the time the principal started, the school was only in the early stages of ICT adoption, and his approach was to take slow and steady steps, and to begin to place an expectation on staff to communicate and plan digitally. Over time this expectation has increased, so that it is now expected that ICT will “*be used for the various things like planning and now assessment recording and so on*”. As part of his leadership role, the principal was able to solve many of the more common technical problems that occurred, and was proactive in the provision of professional development. This included sharing, and encouraging others to share, resources in staff meetings, and running skills-based sessions, as well as arranging for these to be run. By 2008, ICT was perceived as being an expected part of the work culture in School D, with it commonly used in all aspects of school life. Teachers felt this was owing to the leadership from the principal, as well as that gained from the lead teacher in the ICTPD cluster.

### **School E**

The leadership style of the School E principal was in contrast to those of other principals. Perhaps as a result of a history of “*some dysfunctionality amongst the principal and the staff*”, this principal was comparatively more controlling. He noted that the school was not run as “*a democracy. It’s not run on consensus, it’s not run by majority rule. It’s run on what is the right thing to do*”.

The principal and management team (which included a representative from each syndicate) along with the lead teacher/ICT coordinator provided ICT leadership, although by the last round of interviews there was no longer an ICT coordinator in the school. When asked about his role in terms of ICT in the school, the principal indicated he was the “*keeper of the keys*”, with the role he would like to have being a strategic one. He felt he had not “*been a leader in the TELA project*”, which is in line with comments from most teachers at the school. His feeling was that the scheme was “*an important initiative probably in terms of raising their professionalism around organisation and administration*”

rather than being about student achievement. This fits with comments from the teachers who generally felt that the ICT leadership was generally limited to administrative use, with little support for the use of ICT in the classroom.

The ICT coordinator at School E felt that she had not been entirely successful in her role as an ICT leader, largely owing to what she saw as a lack of support from the principal and other members of the management team, and she stepped down from her role before the final round of interviews. Other teachers in the school, however, were more positive about the leadership provided by the ICT coordinator, feeling she had “*shown good leadership*”, and that they would like to see a continuation of her role. The principal was cautious about the leadership efforts of the ICT coordinator. He commented that she had “*been a qualified success*”, and the people had not responded to her telling “*people they should do this and they must do that*”.

In line with the principal’s thoughts regarding the scheme, teachers felt that School E had an ICT culture in terms of administration; however, this was not the case for the uses of ICT in teaching and learning. Teachers at this school were expected to use ICT for administration, but the use of it in their classrooms was a personal or syndicate-driven choice. In the junior syndicate, where the ICT coordinator was based, there was this expectation, and an ICT culture was seen. The lack of school-wide effect is not surprising considering that teachers commented that it needed to be “*driven from the top*”, something which was not happening. By 2007, however, one teacher felt that the principal has “*come along in great strides and can see the strength of ICT. And he can see that it’s very important for, for teaching today, and he can see the huge impact that it’s made on the teaching*”. This was not unanimous, however, and even in the later interviews teachers varied in their views of how their principal perceived classroom use of ICT. In this school, the ICT culture has been driven from the staff rather than the principal. The teacher who felt the principal’s support had increased over the course of the research felt this was because “*all of the staff were very much a part of it*”.

Table 5 summarises the leadership approach that was seen in each of the case-study schools. The principals of Schools A-D believed their schools had a collaborative approach to leadership, while that of School E took a more dominant role. This principal also seemed to have the smallest role in terms of driving ICT use within the school, with the principals of Schools A, C and D reporting they were driving it, and School B’s principal overseeing it. The principals of School A, C and D all provided some form of technical support and professional development for staff, and in all schools there was some expectation of ICT use. In School E this was limited to administrative purposes, in contrast to that in School A, where the expectation was that ICT would be used as part of teaching and learning. In Schools B, C and D the expectation moved from gaining initial ICT skills, through using ICT for administration to its use for teaching and learning.

**Table 5: Overview of leadership roles in each school**

School A	School B	School C	School D	School E
	New to school		New to school	
Collaborative approach to leadership	Collaborative approach to leadership	Collaborative approach to leadership	Collaborative approach to leadership; much ICT leadership provided through ICTPD contract	School not run as a 'democracy' although was a leadership team
Driving ICT use	Overseeing and promoting ICT use	Driving ICT use	Driving ICT use	Staff driving ICT use
Providing professional development		Some provision of professional development	Some provision of professional development	
Providing technical support		Some provision of technical support	Providing technical support	
Expectation of ICT use in teaching and learning	Moved from promoting ICT skills through administrative use to more visionary role	Expectation of ICT use in teaching and learning; recognition of different levels of staff	Expectation of ICT use developed over time; initially expectation was for administrative use	Expectation of ICT use for administrative purposes

### Policies

The Ministry of Education advised schools to develop a clear policy setting out their approach to teachers' participation in the scheme. A list of recommended issues to be considered by school personnel in developing their policies is listed here as presented in the TELA: Laptops for teachers scheme: Information pack.

- What approach does the school intend to take and what ICT development goals will participation in this scheme advance?
- What level of financial support, if any, will the school offer teachers who wish to participate in this scheme?
- What laptop model(s) will the school agree to acquire and support?
- What agreements will the school require staff to sign?
- What cybersafety issues are covered in the above agreements? Please refer to updated sample policy on [www.netsafe.org.nz](http://www.netsafe.org.nz)
- What monitoring or checking of the laptop may the school want the right to perform?
- What professional development opportunities will the school offer?
- Who will pay the excess on accidental damage or loss claims or the costs associated with loss or damage of the laptop caused by negligence? The first time? Subsequently?

- What will happen to the laptop when the teacher is on leave with pay? Leave without pay?
- What support may the school offer teachers who are not eligible to participate in the scheme? (Ministry of Education, May 2004, p. 24).

Also noteworthy is that the Ministry states that ‘the laptops are for the sole use of approved teachers’. This constraint was thought to be a major stumbling-block by the majority of the teachers and principals (although not all). Many ignored this stipulation and used it within their classrooms when needed. Some teachers permitted children to use it on a daily basis. This was always done under supervision, and those teachers who engaged in the practice could not see any reason why they should not do so.

Some teachers did not allow their students to access the TELA laptops. Despite their adherence to the Ministry policy on this matter, they noted their frustration. Most felt it underutilised the potential of the laptop, as it lay idle during classroom teaching hours when they were engaged in other activities with children. For this reason, most of this group felt it to be a waste of resources. A minority of teachers disagreed with the sentiments above and believed that the laptop should be solely for the teachers’ use. They put this belief into practice within their classrooms, by not allowing the children to access their TELA laptop under any circumstance.

The schools seemed to vary in their implementation of policies regarding laptop use, as well as ICT use by teachers in general. There also seemed to be variation within schools, with teachers from the same school sometimes having different perceptions as to the policy. Each school’s approach to the issues of policies, and teachers’ views on this, is reported below.

School A had appropriate use policies for computers in general, with teacher laptops covered in this rather than dealt with separately. The focus of their policy was about not using computers for inappropriate purposes, such as downloading inappropriate material, and for using them sensibly, such as not using all the school’s bandwidth. While understanding that the Ministry’s policy was that teacher laptops were not for personal use, this principal’s view was that *“this is a tool, if you have a use for it, if it can make life easier in some way, and my agenda behind that is to maximise their use of the thing”*. Teachers were generally aware of the policy and felt it was about *“professional judgment and [being] trusted as a professional to use it appropriately”*. Most of the teachers at this school did not allow students to use their laptops, reportedly because of the inconvenience of being without them if they got damaged. This school had good computer access for students, which is likely to have also influenced the decision not to let students use the TELA laptops.

There was a laptop agreement in place in School B, with this seeming to be more encompassing and enforced than that at School A. School B’s policy covered teachers’ responsibilities regarding using and looking after the laptop. While they had discussed issues around accessing sites such as TradeMe and Hotmail, this was not covered in the policy. All the teachers reported signing contracts regarding laptop use, with one commenting that *“a lot of it’s common sense”*. One teacher noted that the contract was *“pretty detailed, I couldn’t tell you what was in it. I remember reading it and signing it and that’s it”*. The current policy was enforced, with the principal conducting audits on teacher laptops. She commented that she explained to staff that her laptop went home but it was only used for educational and school-related purposes, and that although they were surprised she had the right to audit them, they understood the reasons for the policies. This school was looking at expanding their policy, so that the use of email and ICT would be included in a staff code of conduct.

School C also had a computer agreement, which covered *“expectations around how it’s used”*, with additional discussion happening about what some of this entails. Staff were told that where they have been searching could be tracked but there was no report of it happening. Teachers seemed happy with the policy, reporting that it was about

sensible use. While acknowledging that the laptop user agreement stated that they were only for teacher use, they were used by students, as “*they’re too precious a resource for goodness sake, to be sitting there doing nothing*”. Most of the teachers at this school reported using the laptops with their students, under supervision, at times. Those who did not report doing so usually explained that their laptop was used with the data projector, making it unavailable for student use.

In line with the other schools, School D had a policy that covered Internet safety. This policy was seen as being “*pretty sensible*”. It also covered student use; however, a number of teachers commented that they sometimes used it with their students, when another computer was needed. The policy was on the school intranet so teachers could access it. While Internet search histories could be checked, this had not been done.

In contrast to Schools A-D, School E did not seem to have a policy or agreement covering teacher use of computers or laptops, with this left up to teachers’ “*professionalism*”. They had, however, discussed this, covering issues such as the need for being sensible in Internet use, and only having appropriate photos on the laptop. One teacher commented that although there was a cybersafety agreement for children, they had not signed anything but they felt that the expectations of them would be similar. As was the case in the other schools, the principal of School E felt that although officially the laptops were for school use, he did not mind what they used them for, as long as they were sensible. One teacher, however, commented that when she first arrived “*there was a policy that said the children weren’t to use it*”, so this is what she has done.

The level of detail in policies covering laptop use, and ICT use in general, and the level of enforcement of these, varied between the schools. There was also some variation within schools, in terms of teachers’ understanding of the policies. The policies can be placed on a continuum of their level of detail and enforcement, as shown in the following table.

**Table 6: Continuum showing the level of detail and enforcement in ICT policies**

Most informal ←				→ Most formal
School E	School A	School D	School C	School B
No policy; reliance on teachers’ professionalism	Appropriate use policy; largely reliance on professional judgement	Policy agreement plus discussion; auditing possible but not done	Signed policy agreement plus discussion; auditing possible but not done	Signed contract, no personal use of laptops, laptops audited

### Professional development

The improvement and broadening of knowledge and skills, and the development of personal qualities necessary for professional duties throughout teachers’ working lives has long been identified as playing a key role in ensuring they are able to incorporate reform activities into their teaching (Pratt, Lai & Munro, 2001). Comments from all teachers and principals involved in the interviews indicated that professional development was critical to their effective use of laptops, and subsequent ICT use in classrooms. The areas in which professional development was desired can be classified into three types:

- troubleshooting and basic technical problem solving
- skills-based training in the use of the laptop and specific programmes
- pedagogical support, in terms of how the laptop and ICT in general could be used to enhance learning.

One of the requirements of schools participating in the TELA scheme was for them to provide teachers with professional development (Ministry of Education, 2005). It was recommended that teachers be provided with initial skills training on how to use the laptop, augmented with an ongoing professional development programme highlighting effective use of ICT in teaching and learning. In many cases, though, this did not seem to happen. Few teachers reported receiving support upon their receipt of the laptop. Teachers had mixed feelings with regard to the lack of provision of initial skills training. Some felt that giving teachers laptops without support “*was a poor choice*”, while others felt that it was their responsibility to explore the laptop in their own time.

All teachers reported undergoing some form of professional development related to laptop and/or ICT use over the course of this research, but this did generally not take the form of an organised and planned programme. There was variation in terms of the professional development provided both between schools and also within schools. Generally, it included the following activities:

- formal ICTPD sessions, sometimes as part of an ICTPD cluster
- attending conferences
- doing community training courses or tertiary courses
- bus tours
- support from colleagues, principals or technicians
- informal visits to other schools
- participation in online forums.

Four of the five schools had participated (School B) or were participating (Schools C, D, and E) in an ICTPD cluster during the period of the research. Several schools also participated in other clusters, such as literacy, numeracy or inquiry learning clusters, which often had an ICT element to them. Not all teachers in these schools, however, participated in the clusters, while most of the teachers at School B who had participated in the ICTPD cluster had since left. Teachers participating in these clusters were not always happy with the professional development they were receiving, identifying factors such as the focus of the professional development not being what they needed at that time, and the time needed to both attend professional development sessions and to then practise and implement what they had learned. Many teachers also commented on the importance of informal professional development, through having access to just-in-time support or informal conversations with colleagues about what they were doing.

The following table summarises the types of ICT professional development that was reported to have occurred in the schools over the course of the research, and comments on the effectiveness of this professional development. It shows the variation in the range and type of professional development offered within each school, and in its impact.

**Table 7: Type and impact of professional development commonly offered**

School	Types of professional support	Impact and comments
A	<ul style="list-style-type: none"> <li>• Huge focus on professional development in school</li> <li>• Informal support by colleagues</li> <li>• Largely skill based but including classroom-based activities</li> <li>• Principal promoted just-in-time support</li> <li>• ICT coordinator provided support</li> <li>• Move to focus on pedagogical rather than skills/technical support</li> <li>• Visit other schools</li> </ul>	<ul style="list-style-type: none"> <li>• Improved skills</li> <li>• Principal and ICT coordinator felt this was owing to teachers' access to and increasing use of the laptops, through modelling of use, and sharing of how tasks could be done</li> <li>• Expectation that if people attend conferences etc. they will share what they learn with their colleagues</li> </ul>
B	<ul style="list-style-type: none"> <li>• Informal support by colleagues</li> <li>• Largely skill based but including classroom-based activities</li> <li>• Syndicate-based peer buddy system in place</li> <li>• ICT coordinator and lead teacher provide syndicate level support, and with the teacher provided school level support</li> <li>• Technician provided individual support</li> <li>• Conferences – skills and thinking about pedagogy</li> </ul>	<ul style="list-style-type: none"> <li>• Improved skills, but many basic skills still need work</li> <li>• Some of professional development, particularly by technician was too fast implementing skills in classroom</li> </ul>
C	<ul style="list-style-type: none"> <li>• ICTPD contract</li> <li>• Informal support by colleagues</li> <li>• Largely skill based but including classroom-based activities</li> <li>• Interactive whiteboard professional development</li> <li>• Several staff attended conference</li> <li>• Subscribe to 'online help system'</li> <li>• Courses</li> </ul>	<ul style="list-style-type: none"> <li>• Improved skills noticed by ICT coordinator, principal and several teachers</li> </ul>
D	<ul style="list-style-type: none"> <li>• ICTPD contract</li> <li>• Inquiry learning cluster</li> <li>• Informal support by colleagues</li> <li>• Scheduled sessions/staff meetings</li> <li>• Largely skill based but including classroom-based activities</li> </ul>	<ul style="list-style-type: none"> <li>• Improved skills</li> <li>• Effect on teaching and learning (largely owing to inquiry learning cluster)</li> <li>• Found just-in-time tend to work better than scheduled sessions</li> </ul>
E	<ul style="list-style-type: none"> <li>• ICTPD contract</li> <li>• Sessions for teachers to share what they did, although uptake was low</li> <li>• ICT coordinator offered support</li> <li>• Limited other professional development</li> </ul>	<ul style="list-style-type: none"> <li>• Principal commented that teachers don't have time to do professional development, and that ICTPD is "<i>baseline . . . trouble-shooting sort of stuff</i>"</li> </ul>

There was some change in the focus of professional development over time, from a skills-based focus to a more pedagogically-based one; however, external forces seemed to have the most effect on focus. Large amounts of the formal, organised professional development was delivered through ICTPD clusters, meaning school and teacher progression through these programmes has had the most impact, as well as participation in other professional development programmes, such as inquiry learning. Other than these formal programmes, the most common form of

professional development seemed to be that of a just-in-time model, which meant that the professional development varied more on an individual basis than on a school basis. The exception to this was when schools had a particular focus, such as literacy or the implementation of a school management system. Overall, the professional development teachers identified as being of most use was that of a just-in-time nature.

Despite its participation in an ICTPD contract, teachers in School E seemed to have the least amount of professional development, and to report the lowest levels of effect. The professional development in Schools B and C seemed largely to have affected teachers' skill levels, while that in Schools A and D was also reported as having an effect on classroom practice. In School D, much of this effect was at least in part owing to the participation in an inquiry learning cluster.

### Technical support

In order for ICT, including laptops, to be used, it must not only be available but also working (Means & Olson, 1995; Ringstaff, Yocum & Marsh, 1995). The five schools involved in the research varied in the support they used for technical problems, and in the effectiveness of this support. As the following table shows, all but School A employed a technician to help with solving problems and all schools had technical help available within the school. The effectiveness of the technical support varied. One of the key determinants of effectiveness appeared to be the time it took for problems to be solved. Where technicians, particularly in rural areas, needed to be called in, problems usually took longer to solve, which teachers found frustrating. Teachers were least happy with the provision of technical support at School E, despite the multiple avenues available for help. This appeared to be owing to confusion over which form of support should be used when, and to delays in getting help from the on-call technician.

**Table 8: Technical support provisions and their effectiveness**

School	Technical support details	Effectiveness
A	Principal, ICT coordinator or one of three designated teachers	Very good
B	Technician visiting weekly; provides support for a number of schools ICT coordinator provides basic support	Varied from good to erratic; can take time to get problems fixed
C	Principal, ICT coordinator or colleagues Technician who solves problems remotely and visits 1-2/term	Good or excellent Time delay if a problem requires a site visit by technician can be frustrating
D	Principal Technician as needed	Very good
E	ICT coordinator, teacher in charge of ICT, principal, on-call technician and an 0800 number	Varied; none better than average

The amount and type of technical support did not appear to have varied over time, although the number of people who were mentioned as being asked for help did increase. Colleagues were mentioned as being able to help with troubleshooting at the end of the project who had not been mentioned at the start. The three schools where teachers mentioned problems or frustrations related to gaining technical support were rural and provincial schools, meaning that technical support is likely to be less readily available. Having said this, the principals of the two urban schools also had a role in solving many of the technical problems in their schools, so the rural/urban distinction is not clear cut.

### 4.3 Summary of school factors

The five schools involved in this research share similarities and differences. In considering the infrastructure and work culture of these schools we have identified factors that we feel may impact on the effect of the TELA scheme. These aspects are summarised in the table below. It seems clear that at a school level, School A provided a high level of



support for the use of ICT by its teachers, and that School E provided a much lower level. Numerous factors seemed to impact on this; however, one factor that appeared to impact on the others appeared to be the principal's feelings regarding the scheme, and the use of ICT for teaching and learning in general. Those principals who believed that ICT could be of use in teaching and learning provided, in general, the necessary infrastructure and support for its use, and an expectation of use. Other factors that seemed to affect an overall school approach to ICT included the stage schools and teachers were at when the scheme began, and the location of the school (which impacted on available technical support and professional development). There also seemed to be similarities between the schools, particularly in terms of the stages through which schools' expectations for the use of ICT progressed (from skills to administration to use in classrooms to pedagogically-based use).

**Table 9: Summary of the school-level factors**

	School A	School B	School C	School D	School E
Infrastructure <sup>2</sup>	17	13	14	12	11
Collaboration	Collaborative	Collaborative	Collaborative	Collaborative; improved from previous	Mixed
Leadership role in terms of ICT use	Driven	Overseeing	Driving	Driving	Little role
Expectation of ICT use	In teaching and learning in pedagogically appropriate ways	Developed over time, moving to use in teaching and learning	In teaching and learning; to different levels depending on staff skill levels	Developed over time, now expected to use in teaching and learning	For administrative purposes
Policy	Informal	Signed contract	Computer agreement	Policy	Very informal
Professional Development	Affected practice	Improved skills	Improved skills	Affected practice	Little effect
Technical support	Very good	Mixed, could take time	Good	Mostly good	Average at best

<sup>2</sup> Total number of levels attained by end of research (see Table 4)



## 5. Personal factors affecting laptop use

While it is apparent that there is variation at a school level in terms of the work culture that may impact on the effectiveness of the TELA scheme, there is also the potential for individual differences to play a part. Teachers' motivation and expectations of laptop use, as well as their beliefs about the value of ICT for teaching and learning, may play a part in determining how the laptops are used and the influence they have. This section explores the influence of personal factors on the implementation of the TELA scheme.

### 5.1 Motivation and expectation

One of the main objectives of this evaluation was to identify teachers' goals and objectives in using the TELA laptop for various professional tasks and their subsequent patterns of behaviour. This section investigates to what extent having a set of goals and objectives for laptop use may affect how and when teachers use the laptop computers. Each round, teachers were questioned about their goals and objectives of laptop use with respect to the following nine areas:

1. Towards *developing students' ICT skills*
2. Towards *lesson planning*
3. Towards *integrating ICT in the school curriculum*
4. Towards *administration*
5. Towards *teachers' own professional development and professional learning*
6. Towards *the research and development of teaching materials and resources*
7. Towards *ways of working with teaching colleagues in the school*
8. Towards *ways of working with teaching colleagues in other schools and the wider community*
9. Towards *communicating with others*

### 5.2 Goals and expectations of laptop use

At the start of the scheme, some teachers found it difficult to state their goals across the nine areas listed above. Few teachers could articulate goals in all areas. One teacher commented, "*Deep down I really haven't a clue*". Nevertheless, all teachers were able to identify several general goals – including continuing to use their laptop as they were currently. Many teachers indicated they simply wanted to increase the frequency with which they used their laptops; either to continue using it, or to "*use it more and better*", to generally upskill or use their laptops more efficiently.

Over time, goals continued to be imprecisely stated, especially when teachers needed to consider a wider range of possible areas of use. Most teachers could articulate precise goals for developing personal skills and confidence. Goals were made explicit by some teachers: for lesson planning and for locating and developing teaching materials. Some teachers were also able to state school expectations for administrative use but most struggled with expectations for teacher professional development, integrating ICT into teaching or working with colleagues in their own or other schools or the wider community.

The types of goals and objectives identified by the teachers involved and their progression over time are illustrated in Tables 10 and 11. These tables describe the extent to which three teachers at two schools expressed their goals over the three years of data gathering and how their goals and expectations developed. These teachers have been chosen because the information on them is the most complete, and because they represent the kinds of goals identified.

With each year of the research, data in Table 10 shows an increasing level of confidence for the School A teacher, who can be seen to have moved from strength to strength. The scope of her use by the third year of data gathering had expanded greatly. There is evidence that this teacher had focused on goals that were closely attuned to her school setting, and to external expectations, and was resetting those goals within the same constraints and pressures.

**Table 10: The goals and objectives for a School A teacher's laptop use over time**

Goals and expectations	2006	2007	2008
Personal skills and confidence	My whole knowledge of a whole lot of things has grown in that time. My goals would be use IT more and in the actual learning students are involved in.	It has become a much needed, essential part of what we do. My laptop hard drive died. My life was a misery for about a month. It's almost like its your right arm.	I use the laptop for everything! What don't I do with it?
Students' ICT skills	I can help them be more systematic and organised with the way they gather their data by maybe giving them skills, so that they can actually make the choice of which particular software application might be the most appropriate for the particular task.	I've probably not done that very well. One of the next goals is to try and get the students to be a little more critical and critique the information they're finding there. But we do a lot. We're finding the website and narrowing it and not getting them to do wild searches.	Getting into that, looking at your search criteria and looking at how you frame the search and because we've had a big focus on key words and note-taking skills.
Lesson planning	We visit . . . English online and NZMaths online. Increasingly all the resources we have to use are online.	-	I use the laptop for everything! . . . admin documents, planning documents, making up work for children to do.
Integrating ICT in the school curriculum	We're involved in a project to improve children's thinking skills using an integrated curriculum inquiry model. ICT skills will play a part in developing those skills.  We need to say to students "We're using this [application] for another purpose not just to learn our way around the programme."	We're nowhere near the end of what you could be doing. What I need to do is learn how to integrate the use of video, photos sound, use podcasts, blogging wiki, get more home-school flow going.	Podcasting and blogs? Well that's next year's goal isn't it?

**Table 10: The goals and objectives for a School A teacher's laptop use over time - *continued***

Goals and expectations	2006	2007	2008
Administration	We have investigated the school management system which we are going to adopt.	We've got that [the management package] running but we haven't really set up anything definite. We have put some things in there but it's not really in the general psyche yet. It will come.	We're just learning how to master . . . our student management system and trying to do our reports for the first time on that.
Teachers' own professional development and professional learning		Principal and ICT leader work in tandem. They share tips with us and examples of children's work. We have little workshops from time to time when there is a need. I can ask the principal for help with anything and he will show me.	
Research and development of teaching materials and resources	Probably search wider for ideas.  Use the internet to create webquests.	We often do this with our team. One teacher is really active in that regard. She searches out a lot of great stuff.	. . . the Ministry relies on us being able to get information from their website or download curriculum items . . . it's just a given that you just use the web and that's it. [Having a laptop] is not really a choice anymore.
Ways of working with colleagues in the school	Instead of taking notes on paper somebody might sit with Kidspiration open and actually record all our thoughts and ideas. It's a record of our discussion and where we want to go.		Our small senior team of five teachers. Working together and sharing and saying, "well here's a site" or, "here's what you can do with this". Or here's how we could actually get that very useful video that's on You Tube but because it's blocked and you can't show it to the children.
Ways of working with colleagues in other schools and the wider community	We're beginning to develop email trees to get information quickly to parents who have access to email. We keep our website current.	Maybe improving on that home/school connection with email, Internet methods might be the next goals as well.  I should ask my parents "Can I have your email address?" And I can get notices or things to them far more reliably than if I shove a bit of paper in their bags.	Communication between home and school and community is sort of the big push from the Ministry. I'd like to sort of investigate what role does [the Wiki we have set up] play versus what role that a blog page plays and how do you manage those. So I'd like to get more into that aspect.
Communicating with others	We're thinking about the whole podcasting idea and the blogging idea maybe to blur boundaries between home and school.	We haven't managed the blogs. We are going to another school to look at that and get some advice on how to set it up and get it going. It was an ideal but we haven't got there yet.	

Table 11 shows detailed goals and expectations for two teachers at School C. Both expressed quite explicit goals for developing personal skills and confidence in learning about the functionality of their laptops, specific software applications and the use of peripherals but many other goals were less well articulated. Their changing goals and expectations show some progress over time.

**Table 11: The goals and objectives for two School C teachers' laptop use over time**

Goals and expectations	2006	2007	2008
Personal skills and confidence	I want to be able to upskill in the active board and more children's programmes.	I've definitely upskilled. Not as much as I would like to. We've had a gentleman come and work with us, and we were at a conference last week where they showed us a couple of things. So I've definitely upskilled.	I'd like PD on how to find my way around a computer easily, you know the settings and all that.
	I think to work more with movie-maker and just to get to know my way around the computer a bit more. That will come with our ICT contact we are on.	Very little. Not as much as I would like to. I've been working quite a lot with PowerPoint. The kids have been producing them, and we shared them at assembly last term which was really cool but movie maker, no.	I'd like more PD... I feel like I've had quite a bit this year, so I don't know if I need any more but I'd like it to continue.
Students' ICT skills	-	-	-
	Yes [it is an objective for the next three terms.] It is a school wide [objective] but also a personal one		They've been emailing each other, not so much the schools, but other kids. Well we've set up a blog place.
Lesson planning	No	-	I use the laptop to support my planning and assessment. Plans are done on the laptop and are then projected on the whiteboard.
	Yeah I do. That's all I do my planning on – the laptop. Just to continue that yeah.	-	The principal's all for planning on the computer and doing all that. Just up until part way through this year I still did my weekly plans on paper.
Integrating ICT in the school curriculum	Yes.	Yeah.	-
	I am beginning to use the laptop more with my class than I did at the beginning of the year.	Definitely.	I have an active board. I got it last year. I am beginning to use it more.

**Table 11: The goals and objectives for two School C teachers' laptop use over time - *continued***

Goals and expectations	2006	2007	2008
Administration	Yup.		
	No not at this stage.		
Teachers' own professional development and professional learning	Yes.	Yeah. I've done that but I still want more. But I get plenty of professional development.	Technical support, I'd like PD on how to find my way around a computer easily, you know the settings and all that.
	Just my own professional development. Just so I can use it personally more than I do just know my way around it more.		A lot of Interactive whiteboard stuff, which has been great and we've been doing ICT because we've been doing the contract.
Research and development of teaching materials and resources	Yup, developing. I haven't made any specific goals yet - no.	Yeah I've done that.	I look for resources. It would be good to login to the Internet from wherever you are. We use it for prayers, literacy, numeracy, topic, everything really.
	I really just make work sheets on it but I'm sure I could use that a bit further.	It's been pretty basic resources I've made. I haven't made anything fancy with them.	
Ways of working with colleagues in the school	Yeah, probably just to email more rather than going and seeing them.		
	I'd like to get to the stage where we have staff meetings where we share things we've learned.	We have done that – haven't done it for a while but we have done it – definitely.	We have school masses and the principal and I work on those things together. . . We share resources.
Ways of working with colleagues in other schools and the wider community	Yeah just the same. Using emails more.	I'm doing my own school thing not [with] other schools.	
Communicating with others		I'm just forwarding stuff about someone offering to come in. They get saved up for staff meetings and you just flip on to everyone.	

The examples of goals and objectives from these three teachers, from two schools, illustrate the variation in the types, scope and depth of teacher goals. While there are clearly some goals that are driven by the school's focus and culture, there are also individual differences, something that was true of the goals and objectives generally.

Over time, meeting goals and expectations proved to be a much slower process than many individual teachers expected. While the School A's teacher's goal to improve students' Internet searching techniques was refined and better

articulated by the third year, it essentially remained the same goal throughout the three years. Her plan to introduce blogging to the students also needed to be delayed. The two teachers from School C mentioned the need for developing personal skills and confidence across all three years. Both these teachers reported that they had made considerable progress, but continued to identify goals for increasing personal upskilling with applications and hardware such as the interactive whiteboards.

### Impacts of goals and expectations

Seldom did teachers see the difference between learning about technology and learning with technology. While goals for learning about the technology, often on a completely personal level, were well articulated, few teachers expressed goals related to learning with the technology. While goal setting and expectations can be curbed by factors at a school level, they can equally be hampered by a lack of individual or school-wide awareness of what is possible.

The effect school and individual awareness of possibilities can have on teachers' goals can be seen in teachers' attitudes towards professional development. Explicit goals for professional development, stated by these teachers, were to learn about the laptop, its functionality, software applications and peripherals. One of the School C teachers wanted to learn, *"Just [for] my own professional development, so I can use it personally more than I do, just know my way around it more"*. The School A teacher stated that senior management in her school, *"share tips with us and examples of children's work. We have little workshops from time to time when there is a need"*. None of these teachers appeared to realise, in any way at all, the potential of their laptops to support or enhance their own professional learning. Many teachers also did not realise the potential of their computers for various forms of communication apart from email. Teachers' initial goals remained little changed over the period of data gathering.

### 5.3 Attitudes/beliefs and values on use of ICT for teaching and learning in the classroom

It seems likely that the attitudes, beliefs and values of the individual teachers towards ICT, and the role of ICT in teaching and learning, will have an effect on the use and impact of the TELA laptops. Teachers spoke about their beliefs about the potential of ICT (a) to impact on children's cognition, and (b) to serve as a motivating influence. They expressed their opinions about (c) how competent children were with ICT and (d) its role in addressing gender differences in education. Teachers also (e) expressed their thoughts on the role of ICT in the development of positive academic outcomes for children. Each of these themes will be discussed in greater detail along with the clarifying discourse of the teachers, with an overview of the themes presented in Table 12. Generally, the beliefs of teachers regarding the potential impact of ICT did not change to any great degree, although some differences were seen. One teacher commented that, *"I think I, for a long time ignored that they existed, computers, then I thought, 'I can't ignore this, I've just got to go and find out a bit more'"*.

**Table 12: Teachers' comments pertaining to the importance of ICT for student outcomes**

Theme	Description
Cognitive effects of ICT	ICT as supporting logical thinking; critical thinking; visual and independent learning; self-directed learning.
Motivating effects of ICT	Increasing motivation and confidence of children; communicating with parents.
Children's ICT competency	Children's current skills with computers.
Gender and ICT	Impact of ICT on boys' academic outcomes.
Societal impact of ICT	Teaching skills relevant for the workforce and society; home use.
Role of ICT in cognition	The changing role of the teachers and the importance of ICT in children's academic achievements.



### Cognitive effects of ICT on children

Several teachers spoke about how they envisaged ICT had the potential to bring about a positive change in children's cognition. In particular, one principal commented on how computer applications can provide a source of interaction for children on various tasks such as making music or telling stories. Another principal noted the relevance of computers for the development of skills such as critical thinking and problem-solving.

Several teachers also noted the potential of ICT to promote a change to a more self-directed style of learning. ICT was seen as a tool to allow for student-driven inquiry. In addition, the visual dimension of the computer was also seen as having the capability to assist in the visualisation of concepts that may otherwise be misconstrued.

### Motivating effects of ICT on children

Teachers also observed an effect of ICT as a motivating influence on children's desire to learn. In contrast, one teacher cautioned that not all students find using ICT motivating, commenting that several of the children in his class "*hate using it . . . [so] they're not all interested in computers*". The role of ICT in facilitating the curiosity of children and their desire to seek out solutions was also noted. One teacher cautioned that "*It does engage them more, but I still don't think it can fully replace the pen and pencil*".

### Children's ICT competency

Some interesting comments were noted about teachers' perceptions of the competence of children with regard to ICT. Several teachers noted gaps in the ICT skills of children, indicating that assumptions that children are 'computer savvy' are misplaced with regard to several areas. Frequently, the popular perception is that children are 'digital natives' and teachers are 'digital immigrants' (Prensky, 2001). However, several teachers noted that children are not innately competent with regard to certain aspects of ICT. In particular, digital literacy skills such as typing or file management on computers were found to be lacking. Both a Years 1-2 teacher and a Years 7-8 teacher noted these deficiencies, indicating that they are being observed across the educational spectrum of ages.

The indication from these comments is that children, even at higher levels within primary schools, are not skilled in a variety of ICT practices – notably those that involve tasks such as file management and touch-typing. Thus, a continuing need for opportunities to develop computer skills in basic ICT is required, despite the availability and pervasiveness of technology in society and in children's homes.

### Gender and ICT

In the initial two rounds of interviews, three teachers and one principal commented on their observations on the impact of ICT in readdressing gender difference in achievement, with particular reference to writing skills. Teachers of Years 3-4, 4-5, and 7-8 noted that female children outperform males with respect to handwritten tasks. However, two teachers noted an improvement in boys' performance with respect to computer-based writing tasks. As one teacher commented:

*I think it [ICT] is engaging our boys more.... as an incentive, and something that is probably more user-friendly to [the boys, was that] one of their writing tasks was one week on a computer. And the writing that came out of that was great.*

### Societal impact of teaching ICT

A common theme that emerged during the semi-structured interviews was the importance of teaching ICT skills to children to enable them to participate in the workplace of the future. This was seen as an important rationale for the introduction of ICT into the primary school curriculum, and as was previously noted, the ICT skills of these children

were lacking. In this instance, the teaching of computer skills in itself was the main focus, as opposed to using computers to teach a particular theoretical concept or skill, such as numeracy or spelling:

*They are learning different skills. I mean they are skills they need for the world we live in. Say like, keyboard skills and mouse, programme and Internet skills, you know.*

As part of this increased emphasis on ICT being used at primary school level in classrooms, there was an awareness that children were already using ICT at home. As one teacher explained, using ICT was important because “*you’re actually more at their level, because [it’s] what they love, it used to be that your teacher was way behind the eight ball*”.

#### The role of ICT in the academic performance of children

Several comments by teachers relating to their beliefs of the potential impact of ICT on children’s cognitive and social learning mentioned that it was how technology was employed that was important for academic outcomes. The use of technology was seen as a neutral tool by some, but others noted that it was how it was employed that was of significance. As one teacher commented, “*In itself it’s not going to lift achievement, in itself it’s not going to do all the marvellous sort of things we want to do*”.

### 5.4 Summary of personal factors

All teachers who participated in this research believed that ICT could have a positive impact on teaching and learning, although they differed in the type and level of effect it could have. Teachers’ beliefs generally appeared stable over time, although there was some shift regarding its potential effect on students’ achievement. Insufficient information regarding teachers’ beliefs and goals was able to be gathered from the interviews to draw a firm conclusion regarding this relationship. It did seem, however, that those teachers whose beliefs regarding the potential impact of ICT were rooted in pedagogical change were more likely to identify specific goals relating to the use of ICT in teaching and learning. This is something that needs further exploration.

One of the issues that arose during this research was that few teachers were able to fully articulate goals in all areas. Several teachers made comments about lacking sufficient knowledge to identify goals, along the lines of ‘not knowing what they didn’t know’. The very general goals that were often identified seems to support this. Others commented on the relationship between their individual goals and that of the wider school. For teachers, individual goals were driven both by the school’s focus and culture, and also their individual focus, beliefs and skill level.

## 6. Impact of the laptop

From the interviews and our observations, it is clear that the TELA scheme has had an impact on all the teachers and schools involved in this evaluation. As one teacher said, “*basically I don’t think we could do our job effectively any more without it*”. However, there was variation in terms of the level of impact the laptops have had. This section will explore the impact the laptop had on leadership, on various aspects of teachers’ practice, and in terms of any demands it placed on teachers and schools.

### 6.1 Leadership

As discussed previously, the leadership models and the role of the principal in the five schools differed, and seemed to affect how the TELA initiative impacted on teaching and learning. Leadership and principals’ roles in several of the schools also changed, to a lesser degree, over the period of the research. What cannot be determined, however, is the degree to which these changes can be attributed to the laptop initiative.

In School A and School C the principal’s role and leadership style had changed little since the beginning of the research. These principals had been driving the use of ICT in their schools and expecting its use in teaching and learning since the inception of the TELA initiative. Changes in leadership style and the role of the principal were seen in Schools B and D; however, in both cases these principals were relatively new and so the changes may have been owing to their increasing knowledge of the staff at their new schools, rather than the TELA initiative. School B’s principal believed her role had been able to become more visionary over time, while School D’s felt that he had been able to change his expectations from an administrative to a teaching and learning focus. It is difficult to determine the degree of change in terms of leadership in School E, owing to the contrasting comments made by the teachers who were interviewed. From the beginning to the end of the project, teachers had differing views with regard to the value the principal placed on ICT in teaching and learning. The teacher who felt that principal’s leadership in this had increased believed it had done so owing to the staff having driven it.

### 6.2 Teachers’ practice

The effect of the laptop scheme on teachers’ practice will be explored through looking at the impact on teachers’ professional growth, collaboration, their use and creation of resources, lesson planning, administration and on their classroom pedagogy.

#### Professional growth

Two areas of professional growth were identified as occurring over the course of the research project. Teachers grew in their confidence and competence in terms of their ICT skills, and to a lesser degree in the use of ICT in teaching and learning. Most commonly, participants commented on the former. Even in the early interviews, teachers commented that they had gained ICT skills since they had the laptops. Despite the improvement, there was still a need to improve on basic computer skills for administrative tasks, with teachers commenting that it still took them a long time to do some tasks. Others noted that working on the laptops could be frustrating owing to their lack of knowledge. Over the course of the research, it was noticeable that participating teachers increased their skills and confidence. While most still acknowledged a need to continue improving in this area, they recognised how far they had come.

A key feature of the laptop that has allowed the increase in ICT skills is its portability. Simply being able to access the laptop in a teacher’s leisure time, in a relaxed environment, enabled many of the teachers to upskill at a relaxed pace. This emphasis on ‘time to play’ and ‘fun’ and ‘experimentation in a relaxed environment’ were key factors in facilitating this change. Some teachers commented on how the sense of ownership gained through the TELA scheme enabled them to learn more quickly.

The resultant increase in confidence with regard to ICT helped some teachers use ICT with their students. As one teacher explained,

*What happens now is I'm more confident to verbalise it and showing it to kids, whereas before, I'd do something I used to get someone in who knew more than I did to teach/explain it to the kids . . . I'm actually; I'm becoming more instinctive with what needs to be done.*

Other teachers and principals agreed, feeling that as teachers gained more confidence, they were more likely to use ICT in their teaching and learning. How the laptop affected teaching and learning will be discussed further in later sections.

### Collaboration

In this research, collaboration was explored both at a school level and at a personal level. In asking teachers about collaboration we asked about whether or not and how they communicated and worked with colleagues and others. The level of collaboration of individual teachers was largely related to the degree to which the school culture in which they worked encouraged collaboration. At a school level this was done both through the provision of infrastructure that allowed it, such as an intranet, and a promotion of it, such as an expectation that resources would be shared.

As such, teachers from School A, which had a culture of collaboration and the infrastructure to encourage electronic collaboration, reported high levels of collaboration. This was apparent throughout the research and was seen in both communication and in the sharing of resources and the degree to which teachers referred to working in teams. The laptops facilitated this kind of collaboration, as one teacher described,

*Our whole school communicates backwards and forwards all the time with email. I put messages on our intranet news that needs to be circulated round the whole school, I mean everybody agrees to open up the intranet during morning tea and get any notices and messages. I put documents into our public, shared folder that children can access, drag those out onto their desktop and use those. I mean it might have website addresses. . . I use [the laptop] all the time to access our guidelines for curriculum planning and assessment.*

As the principal explained,

*There's a high level of collaboration in terms of planning . . . and people sitting around developing one document, emailing it to everybody, using public shared folders, teachers' shared drives . . . so . . . sharing resources . . . [The laptops have] certainly made people be connected.*

Schools that lacked this infrastructure and the support of the principal in updating and maintaining the school intranet reported considerably less electronic communication and collaboration. Checking the school intranet pages and checking email was a strong motivator for staff to engage with ICT for professional communication and to subsequently explore emailed weblinks, etc. Much of the success of this means of communication lay in the expectation the principal placed on its use. In schools where the principal used paper notices passed around to teachers in class, there was less emphasis on checking email, and it became an unnecessary communication channel in that school, and irregularly checked.

An increase in electronic communication and collaboration was seen in schools as their infrastructure changed over the course of the research. In School B, teachers increasingly reported using their laptops to take notes in meetings, and then sharing these with the staff involved, using either email or the school network. Laptops were seen as enhancing the existing work culture, rather than changing it in School C. As the principal noted, the laptops had impacted on the school's work culture in terms of the efficiency of work rather than in changing the planning, processes or attitudes to

work. For example, the laptops made it easier for teachers to use the shared space on the school file server to share plans and other work with their colleagues, compared to before the scheme.

By the third round of interviews, School D's principal believed that his school's work culture had been affected by the TELA scheme. He noted it had been "*gradual and slowly*", with changes in the way people work to incorporate technology. For example, planning now tended to be done on a computer, rather than on paper first, to reduce double handling.

Over time, technology was also increasingly used as part of the collaborative process in all schools other than School E. The sharing of resources and team planning was more common and was seen in all schools. Some schools had scheduled time for sharing skills and resources, while in others it was more serendipitous. Again, the degree to which this happened seems to be affected by the culture of the school, although individuals did report sharing with close colleagues even when it was less common in the school as a whole.

### Use and creation of resources

Teachers identified three ways in which having laptops affected their use and creation of resources. Teachers most commonly referred to locating resources to use in their classes, followed by adapting resources to suit their purposes, and, to a lesser extent, to creating resources.

The resources teachers adapted and created were generally Word or PowerPoint-type resources, although there were examples of teachers creating more intricate resources, such as movies or webpages. This became more common over the course of the research, with several teachers towards the end of the project creating wikis and blogs for use with their classes. Several teachers also commented on working with students to increase their ability to search for resources.

Over time it seemed that for most teachers the use of the laptops for accessing and creating resources was something that teachers seemed to take for granted, as it was not mentioned in later interviews until asked about specifically. The nature of the resources being found and utilised seemed to alter over the course of the research. In the early interviews, teachers talked about finding worksheets that could be printed and used offline, or good websites. Towards the end of the research project, however, teachers talked about using software sites, YouTube clips and other videos, and sites with interactive games and activities, designed to be used online. The teachers with access to interactive whiteboards also talked about using their laptops to create resources for this from home. Teachers from School E were less likely to report accessing resources using their laptops throughout the research project. This may be owing to their inability to connect to the Internet using their laptops until the final stages of the project.

### Lesson planning

All of the teachers interviewed noted an advantage in having a TELA laptop for the purpose of report writing and preparing lesson plans. Whilst there was variation in many of the other uses of the laptop (ie, in teaching and learning or personal use), the common factor of laptop usage was that all teachers carried out administrative and planning tasks on the TELA laptop. This persisted throughout the course of the research. For some teachers, planning and administration work represented most of their laptop use, even at the end of the research project.

In all schools, teachers used the TELA laptops for lesson planning. Having been provided with a personal and mobile computing device, teachers have been able to avail themselves of the advantages the mobility has brought them, and to carry out classroom planning at a time that suits them.

Teachers' increased access to laptops led most schools to work on setting up standard planning templates. After the initial process of setting up standard planning templates for use across a school or syndicate, efficiencies were noted in being able to reuse and adapt templates and outlines of plans. Over time it became common for teachers to take their

laptops to planning meetings, and to do all their planning directly onto the laptop. Over time it also became more common for less paper to be used. Early in the project teachers reported taking notes, typing them up and then printing them out. This evolved over the project so that by the end several teachers commented that they no longer used paper, making any alterations directly onto the laptop during the class. Some teachers, however, found that when they first got their laptop they were using it indiscriminately, and that over time they discovered that sometimes it was more efficient not to use the laptop.

### Administration

As mentioned previously, one of the main reported impacts of the TELA scheme has been to improve the administration activities of teachers. This was unanimous across schools and for all teachers. Again, the school's infrastructure impacted on the degree to which teachers used their laptops for school-related administration. The schools with a school management system required teachers to do their administration via computer, and the laptops meant that teachers now had more flexibility about when they did this. Similarly, they gave teachers flexibility when doing reports, which all schools required be done electronically.

While School A did not have a management system, its teachers used their laptops for a "*lot of admin, like notices, newsletters, planning*". A management system was being implemented, and teachers identified several ways in which they would use their laptops for administration once this had occurred, including the ability to "*collate the assessment data . . . the national data that relates to reading and things like that*". Teachers at School C and School D also mentioned using their laptops to work with assessment data, finding this had benefits. Some teachers also used their laptops in meetings, with this most common in School A and only rarely mentioned in other schools.

Again, school factors appeared to impact on teachers' use of laptops for administration. Teachers' comments showed that much of the administration work done on computer was owing to a school requirement that it be done this way. Similarly, schools with an intranet or culture of using ICT for communicating administrative matters had, not surprisingly, teachers who reported using it for these purposes.

### Pedagogy

One of the key questions being asked in this evaluation was whether or not having a personal laptop would affect teachers' use of ICT in the classroom and their general pedagogy. Most teachers were able to identify ways in which having a laptop impacted on their teaching, although this was often through indirect means, such as planning, administration and the finding or creation of resources. This was particularly true of the initial rounds of the research, when the most commonly cited impact of the TELA scheme was in facilitating planning and administration as opposed to encouraging more innovations in terms of pedagogic practices. The following quote from the round 2 interviews in early 2006 exemplifies this,

*It just sits on my desk and I just use it at lunchtimes and after school and that's about it really, just for my own administration really. That's probably the level I'm at.*

ICT was, however, being used in the classroom, to varying extents, in all five schools. The following table gives examples of how ICT was being used by teachers who took part in all rounds of the interviews. From these examples, it seems apparent that the way in which ICT was being used changed over time, for at least some teachers. How ICT was being used in classrooms, and how this changed over time, is explored in this section.

Table 13: Examples of classroom ICT use

	Rounds 1 and 2	Round 3	Round 4	Round 5
Teacher, School A	We just got them to use Kidspiration . . . . Or they'd do KidPics to do with a science topic or something like light – they might draw something that produces light, and they'd have to write an explanation underneath and then we'd put that together as a slide show and might show that to parents. Or math statistics units where you use Excel to make specialised graphs to present data . . . and making music, PowerPoint presentations . . . all those sorts of things.	Our topic is Reach for the Stars which is all about space and, I mean, the number of fantastic websites and you know, videos and graphics and close up photos and all sorts that the children are accessing two or three times a week using ICT . . . we've just started doing these virtual post-cards. I mean they have to choose a planet that they've got to send a post-card from. They have to do the research before they write the virtual post-card then they're going to email that to me.	They're just finishing off this extreme sport web quest . . . so getting them to . . . to find out what extreme sports are, . . . then right down to the history of Queenstown and why it's become that. . . . I use it pretty much every day for maths. One group will always be on our learning link site . . . Everything, what don't I do with it! Well email, Internet access, developing the wiki page, showing children um, video clips that are available via the Internet that support our learning.	Using CD ROMs to do reading activities or you know, that sort of thing, the access to information that children can have and how you can actually try and teach them how to find what they need to find and how to cross reference and things like that. Probably never used to do that before. Um and I think it's hopefully just modeling to them that although they might use the Internet for quiet entertainment purposes, they see that we just use it seamlessly and it's about learning.
Teacher, School B	I would just go and find relevant websites, print off what I think will work and then use paper versions with the kids for reading or searching or whatever we are doing.	I've got kids to do their own slide-show presentations and stuff.	The kids are doing a social studies reading research thing on great minds . . . this whole thing's going to be a PowerPoint presentation. Twice a week they have some computer activity. . . I integrate more in maths now, and science so that we do a lot of paper work and calculations, like, for graphs and stuff, we repeat the whole process on Excel.	It's good for information on the Internet.
Teacher, School C	Word processing and stuff. . . . We've done PowerPoint, Internet use.			We use it for prayers, literacy, numeracy, topic um, everything really. The way I teach has changed heaps. . . It's more about them finding out than me telling them.

Table 13: Examples of classroom ICT use - *continued*

Teacher, School C	One of the activities on [my reading programme] is word processing skills and the children have to read through the instructions and it might be changing the font on the computer or things like that. Typing up stories. We have quite a few maths games that we play or that they play when they've finished work. . . . when we've been doing inquiry topics or anything like that – they [children] are often on the computer . . . looking on Google or some of those sites finding out information.	They've been making PowerPoints themselves.	We did email kids from some other classes. We did that a little bit. . . With our inquiry, they do a lot more research.	The kids have been doing [blogging] . . . they've been writing stories.
Teacher, School C			It's a reading game.	Children use them for maths games, reading games.
Teacher, School D	Mainly photos of kids doing stuff at the moment . . . now that we're sort of getting more in touch with some of the maths activities that are available, we're using it for that.		What some of the kids are getting used to doing is plugging in the camera after they've taken the photos and going through the process with me of printing that out. As part of our reading programme and maths programme, it will be like an independent activity you've got. I like to use it more for kids sort of writing out their stories and things like that.	We found a really cool song on YouTube . . . and so . . . bringing that up on the projector and showing it. . . sometimes I've found games and things so you can bring them up . . . and two or three kids can do that at a time . . . they've taken some photos of the swimming . . . and print out the photos and stick them in their books and write stories about them.
Teacher, School E	The latest CD that the children use. Also I take lots of photos . . . It's like a little movie. We put it up and they get to see that . . . There are some websites that we get games from and play the odd time.		Sometimes I let them do word processing and things.	Word processing, we did a unit on using the digital camera, so putting them onto there and editing and things like that . . . and the Internet when they're doing their inquiry units. And maths games and things like that.



Teachers were asked directly about the impact of the TELA scheme on their teaching, and their use of ICT in teaching. Even in the early stages there were indications of changes in pedagogy related to ICT use, although at this stage it seemed likely that this was owing to factors other than the TELA scheme. In the first two rounds, six teachers commented on their role and seemed to indicate a shift towards student-centred tasks.

*I try and get away with one expert that will roam along the back of the three [children working on the computers] and help. And when they are finished, they'll go and get the next person on the list and they become the tutor... putting their hands behind their backs [so they can't grab the mouse but give verbal instructions] and that type of thing... As long as they have their hands behind their back and they are co-piloting because the temptation to lean over and go, "you push this!", is [strong]. But you say, "They won't learn if you push. Put your hands back behind your back and tell them what they are going to push and why". And they do do it very well. They're very supportive of each other.*

By round four, most teachers had been using their laptops for between two and three years, and references to changes in the way they taught were appearing. At this time the pedagogic approach in which ICT should be used in the classroom was a recurring, at times implicit, theme in the interviews with School A staff. When asked about how they used ICT, the teachers at School A usually referred to pedagogy, rather than ICT skills or programmes. Part of this, they felt, meant recognising that "you don't just do everything [using ICT] but it's becoming part of your day, and all the time". As another teacher explained,

*You find yourself setting up things that kids could be actively doing ICT-wise, but we've still got to remember that they're still only 9, 10, 11, and some of them, a lot of them, still need basic reading, writing, maths skills. If they don't have them, then, that's going to all be their downfall later on anyway, so it's trying to find that happy medium between using ICT to still help those basic literacy and numeracy skills, but not to use that at the detriment of their progress in that way.*

In contrast, while teachers in School B were using ICT, it tended to be in order to support rather than change existing pedagogy. ICT was used to do the same tasks in a different way, as this example shows,

*I integrate more in maths now, and science, so that we do a lot of paper work and calculations, for graphs and stuff, but then, the next step, we repeat the whole process on Excel, and you know, whether it's making up science graphs or maths calculations and stuff. A lot of it is quite good and the kids quite enjoy that next step. But they're a lot like me, whenever we've come back to it they've forgotten.*

The limited access to computers in the classroom may have contributed to this. In this school most rooms had only one computer, making it difficult to use computers as a regular part of the school day. Access was augmented by a central laboratory, where activities such as that described previously could be done.

By round 4, the teachers in School C had mixed feelings about the effects the TELA project had on their teaching. All teachers felt it was having some effect, but the type of effect varied. The ICT coordinator talked about the resources that were available, the increase in her own knowledge and the role ICT played in students' learning. Another teacher at School C felt it had "affected my planning which rolls over to your teaching", while another teacher felt she had become more "adventurous". Only one teacher commented on a change in the way she taught, noting that using the interactive whiteboard had "changed the way I teach reading".

In School D, teachers were able to identify ways in which ICT had been integrated into teaching and learning since the inception of the TELA project. The principal explained that the initial impact was on “*planning and administration, but now we are moving into a stage where it is impacting on the way teachers teach . . . it’s probably extended the range of activities and things*”. The ICT coordinator commented that ICT is,

*Becoming more integrated into the planning and into my thinking . . . you automatically think, oh yes we can do that or can make do there or you could do this or you could take some photos and make a photo story or you could do a PowerPoint . . . not think you can make a chart or draw a picture.*

While it seemed that ICT was integrated to a greater extent in her teaching, it did not seem to have changed the way she taught. The difference lay more in how tasks were done, rather than what kinds of teaching occurred.

Teachers in School E also reported using ICT in a variety of ways in the classroom by round 4. Most teachers used it mainly as an alternative way of doing tasks they had always done, such as word processing or using the Internet for research, although one teacher was creating a blog with her students. Another teacher talked about the kinds of things she currently did,

*I’ve done it for presentations for the children, I use it for keeping their photos and doing loops on it, so the kids can actually enjoy seeing themselves when they were five, and now when they’re Year 8 or 8-year-olds. The games for the kids, all those problem-solving ones.*

In the final round of interviews, comments from most teachers suggested they had continued to progress in terms of their use of ICT and changes in pedagogy. Interestingly, although the teachers in School A were those who had consistently talked about the importance of considering pedagogy when using ICT, and how it allowed them to rethink practices, they were also those who talked about how far they had to go. As their principal explained,

*Even though we’ve done some quite nice things and done lots of different things and children have lots of opportunities, I still think we are just scratching the surface and it just comes down to people being busy and also you’ve got a generation of teachers who are building new understandings on top of past practices. And we haven’t got to the stage yet where the technology all fits seamlessly into what you are trying to achieve and trying to do.*

A teacher concurred, commenting that it was about how they could “*harness the technology to make the literacy, numeracy even better . . . it’s almost like trying to think about learning in a different way*”. The teacher went on to reflect on how their use of technology had changed,

*It’s just so normal now, it’s like I can’t even think back. Well I can, I can sort of think of using CD ROMs to do reading activities or you know, that sort of thing or maths games, but we certainly you know the access to information that children can have and how you can actually try and teach them how to find what they need to find and how to cross-reference and things like that. Probably never used to do that before. And I think it’s hopefully just modeling to them that although they might use the Internet for quiet, entertainment purposes that you know, they see that we just use it seamlessly and it’s about learning. And it’s about, I mean it can be entertaining too but trying to show them the various ways that it can be harnessed as well.*

In School B, there had not been the same level of change. One teacher commented that having the laptop had not affected his teaching. The ICT coordinator commented that, “*with a lot of teachers it’s been pretty slow, like that*

*they've learned to do a lot of administrative functions, just to do that. Their planning and their assessments and just having it all in a central place*", although having data projectors had made some differences. The principal recognised that they had a way to go, commenting that the plan for future is around: *"How we want to use it and also the thinking skills connected with it. And just that whole thing this just isn't for email"*.

By round 5, teachers in School C all felt that their teaching had changed. As one teacher explained, *"it's more about them finding out than me telling them"*. For some teachers the change was more about the extent of ICT use and how work was done rather than the underlying pedagogy. A teacher explained how she used ICT in her class,

*I use a lot of interactive things with the kids. I demonstrate whole class, not very much whole class, and then use [the interactive whiteboard] as a teaching station. Or use it as a practice station depending on what's happening. The computers usually have either one or two children at a computer doing interactive activities to support their learning. Often taught on the active, shown how to use them on the active board and then access them themselves on the computer.*

By round 4, teachers at School D had been beginning to think about the way in which they used ICT in the classroom. Comments made in round 5 showed that they continued on this journey, particularly as the school was participating in an inquiry-based programme. As the principal explained,

*I think it is filtering down now to classrooms particularly looking at the inquiry approach, where a lot more children are accessing the computer to find out information or check on something or look at timetables . . . that sort of information, so, whereas they might have had to wait until they were in the library. Now they can access something, whenever almost instantly from the classroom . . . So yeah it is, it is changing um, information gathering in that respect.*

It seems, though, that they were still at an early stage of this journey, with changes generally restricted to information access, rather than changes in pedagogy as a whole.

Pedagogy seemed to have changed to a lesser degree in School E than in the other schools involved in this research. Individual teachers were making use of ICT, but generally as an alternative way of doing tasks, such as using PowerPoint for presentations, or the Internet for information, rather than through changes in the way they thought about teaching and learning. The ICT coordinator commented that,

*There have been huge shifts . . . But we still haven't probably pushed that enough, and the bit that I find disappointing is, we know how to use a laptop but we haven't really, you know, picked up that ICT and run with it for the kids.*

Overall, then, it appears that the impact on pedagogy had varied, both between teachers and between schools. The following table summarises the differing views on pedagogical change in each of the five schools, with comments chosen that represent the views of teachers in each school.

**Table 14: Comments made by teachers regarding pedagogical change by round 5 in each school**

School	Comments made in round 5
A	There's been a strong impact on children because the way teachers work has shifted, the way they think about work has shifted. It's gotta be, it's almost like trying to think about learning in a different way.
B	Has it affected my teaching? No not really. Their planning and their assessments and just having it all in a central place . . . certainly the projectors and that, is changing the way we teach, slowly.
C	The way I teach has changed heaps. It's more about them finding out than me telling them.
D	It is filtering down now to classrooms particularly looking at the inquiry approach . . . it is changing information gathering.
E	Have been some huge shifts . . . but we haven't picked up that ICT and run with it for the kids.

### 6.3 Additional demands

#### On schools

Early in the project few teachers identified any additional demands that had been placed on schools as a result of the TELA project. This may have been for two reasons. Firstly, teachers had little, if any, role in the general school administration and therefore may have been unaware of demands that may have been placed on the school because of the project. Secondly, early in the project teachers may still have been exploring what they could do with their laptops and had not got to the stage where they appreciated their full potential. By the end of 2007, however, participants from all schools had identified ways in which the laptop scheme had resulted in additional demands for them or their schools, either directly or indirectly.

In School A the provision of the TELA laptops had led to an increasing demand for using the ICT currently available in the school, and for more of it. The increased use meant reliability became more important, while there were increased demands on storage. Teachers were also working more and harder, and increasingly worked from home. This led to the demand for teachers to be able to access the school's intranet from their homes, something that was implemented the following year. This, in turn, led to at least one teacher getting broadband at home, so they could make good use of this. The school's wireless network was also upgraded and expanded, while the demand for a wide range of ICT and peripherals, including data projectors, cameras, speakers had also increased.

School B also needed to upgrade their wireless network as a result of the TELA scheme, while the demand for technical support increased in general, as staff wanted the technology they used to be reliable to alleviate frustration. They wanted more knowledge on how to make best use of their current ICT, as well as additional technology. One of the issues that arose was a lack of space and suitable space in classrooms, which made using the technology they had difficult.

The provision of laptops had workload implications, with the principal noting that, *"it has increased the hours of work . . . for a lot of the teachers here . . . and the job/personal life has blurred"*. The teachers agreed, commenting that they sometimes wasted a lot of time using their laptops. One teacher from School B said, *"I really have to make myself sometimes not take it home, because I can... waste quite a lot time on it. . . You kind of save time but you waste time and I'll just think, I'll just write this up now, and really I need to pack it away and just have some 'no-school' time."*

As in School A and School B, having the TELA laptops had led to increased demand for ICT in general by teachers at School C. Teachers at School C, like those in School B, identified the need for more professional development and

more time for this, and for technical support that was more readily available. At times there were problems with the wireless network and with synchronising the laptops with the school system.

Having the laptops, and being part of an ICT professional development cluster, had led to several additional demands. There was a growing need for more than one computer in a classroom, and for additional peripherals such as cameras. The school had upgraded their server to accommodate the laptops, and had just upgraded their network. Initially there had been an increase in frustration with the technology, but that was,

*Getting less and less and less because the technology is improving all the time and, much of that side of frustration is just usually your own and not the equipment at all, and so as people's skills are up, improving, their ability to solve their own problems is increasing and so on.*

When asked about the effect of the TELA scheme on School E, the principal commented that it had been “*hugely expensive*”, often in unexpected ways such as through increased printing costs. They had also reconfigured their network to allow teachers access to it via their laptops, something that was not available for most of the project. One of the teachers noted that her workload had increased, as she now spent time helping others use their laptops. Teachers generally expressed a need for increased access to immediate technical support, and access to ICT other than their laptops. One of the issues with this was that there was insufficient space in many of the classrooms to add additional computers, a problem that also faced those in School B.

#### On teachers

Participants identified ways in which the TELA scheme made additional demands on their time. Early in the research teachers talked about the time it could take when using ICT, owing to having to learn new skills, set up equipment and deal with problems. Several teachers commented that tasks took longer than they had previously, although by the end of the project teachers were commenting that they were now saving time by using the laptop, and working directly onto them. The ability for teachers to be able to work at home was seen as a great advantage of the TELA scheme; however, several also commented that it meant that they now did more work at home, and worked for longer.

Another area in which having a laptop had a negative impact on teachers was financially. A number of teachers found that in order to make best use of the laptop they had to have a home Internet connection, while several also used printer ink and paper at home, which had financial implications. Others deliberately chose not to print at home, in order to reduce the cost.



## 7. Discussion

This report presents the findings of a long-term qualitative evaluation of the impact of primary school teachers' access to laptops as a result of the TELA scheme. It has explored the impact of this scheme, and the school and personal factors that may have impacted on it. In this section we will explore this further, looking firstly at the effect personal factors had in determining the impact of the scheme, and then exploring how school factors have impacted on the scheme. We will discuss how personal and school factors have interacted, and the effects this has had, before addressing the research questions directly.

### 7.1 Personal factors and impact of the laptop scheme

As part of this research we explored two personal factors that we believed would affect use of the TELA laptop: teachers' goals and objectives regarding the laptop, and their beliefs regarding the value of ICT for teaching and learning. All teachers involved in the research believed ICT could affect children's learning, although often this was through motivating and engaging them, rather than in directly enhancing or enabling achievement. Over time there seemed to be a small shift for some teachers, to believing ICT could have a direct effect as well as the indirect motivational one. There appeared to be a relationship between teachers' use of ICT and their beliefs regarding its value such that teachers who identified the potential benefit of the laptop in terms of administration and preparation tended to only use it for these purposes, which may have precluded them discovering other ways in which it could enhance their practice. The relationship between beliefs and use of ICT is limited, however, as while all teachers believed ICT could be of value, many showed limited use of it in the classroom. Those teachers who did use it more seemed to be those who had a deeper pedagogical understanding of how ICT could be used to enhance teaching and learning.

Teachers' goals and objectives seemed to be in line with their actual use of the laptop and of ICT in general as reported in interviews and as seen during observations. What is not clear, however, is whether this was because teachers were identifying goals based on their current use of ICT, whether their goals and objectives were driving their use or (quite possibly) both. It is also important to realise that goal setting is a complex process and one in which teachers were not always entirely in control. Goal setting and clear articulation of goals may depend on a variety of factors that go well beyond individual motivation and expectation, such as the school factors discussed in this research. External requirements clearly appear to contribute to the formation of an individual's goals and expectations, but equally they may also elbow-out other goals and expectations, which, in turn, become less important.

### 7.2 School factors and impact of the laptop

Situational factors, such as infrastructure and school culture, seem to have mediated the impact of the TELA scheme as well as teachers' setting of goals and objectives. Leadership appeared particularly important in terms of the impact of the TELA scheme, with both principals and teachers commenting on the need to have the principal supporting and driving the project. It seems that the leadership of the principal may have had this effect through two mechanisms. Firstly, having the principal driving the use of ICT makes it difficult for teachers to 'opt out'. Several teachers talked about the expectation of ICT use and the knowledge that 'this is what we do here' as being important. The other mechanism through which the principal's leadership appeared to work was through the provision of infrastructure and support so that teachers could make good use of ICT. Comments from several teachers referred to frustrations at not being able to use ICT as they wished owing to technical or access problems.

The network infrastructure and computing resources varied in each of the schools and only one reported that they had sufficient resources to have more than two children per classroom on computers at the one time. In one of the schools the central computing facility had become outdated at the start of the research and this had been a deterrent to teachers

developing ICT activities for their children. One teacher noted her frustration with the current computing arrangement, and indicated that her students had had access to a computer only once during the current school year.:

*I've been over once [to the computing facility] this year, just to do word processing, but I wouldn't go over there again until the new computers come, because you go over there and there is 15 computers and of those 15 you might get 6 that go. They are just diabolical at the moment, so it's just not worth the hassle.*

The same teacher commented on how this lack of infrastructure had impacted on her experience as part of the TELA scheme, and how new computers for the central computing facility would be a key factor in facilitating a change in the ICT teaching practices. One teacher noted that it was not the laptop itself, but the school's network infrastructure that was a key factor in facilitating ICT as a teaching tool. All schools upgraded their technology over the course of the research project, which is to be expected given the three-four year timeframe of the research and the recommended three-four year life of a computer. Despite the upgrades, teachers in most schools continued to talk about access as being an issue. In some schools it was a determining issue, with a teacher from School E noting she had fewer computers (one) in her class at the end of the project than the start (four). In other schools teachers talked about what they could currently do, but also what they would like to do in an ideal world. Teachers at School A seemed happiest with their access, which is not surprising considering they had computers in each room, pods of mobile computers and a central computing room. Teachers from this school commented that they could usually gain access to additional hardware if they could make a pedagogical argument for it.

Other aspects of school culture affect teachers' use of the laptops and ICT use in general. The policies that were set, for example, impacted directly on how laptops could be used. Schools differed in what their policies covered, with School B emphasising that they were for work-related purposes only. In contrast Schools A and D explained that they were happy for teachers to have personal material on them, as using them for personal purposes may lead to classroom use.

Schools' ability to provide immediate technical support and professional development also seemed to be a key factor in determining the impact of the laptop project. In two schools most professional development and technical support was provided by the principal, and teachers commented on how much they appreciated the just-in-time support. The principals in these schools commented that although it was outside their job descriptions, and took a reasonable amount of time, they felt the advantages of providing this immediate support outweighed the cost to them.

### **7.3 School factors, personal factors and the impact of the laptop scheme**

Personal and school factors did not affect the impact of the TELA scheme in isolation. As the diagrammatic explanation of our research questions showed, personal factors that may affect laptop use are embedded within a broader school context. This is what we hypothesised at the conceptualisation of our research, and while this representation was adapted based on our findings, this core concept has remained. From our findings it seems very clear that: school factors affect how ICT is used, personal factors affect how ICT is used, and school factors interact with personal factors to affect how ICT is used. A participant from School E was equally as passionate in her beliefs about the value of ICT as one in School A, yet the teacher in School E was unable to meet many of her goals owing to factors beyond her control, such as access to ICT in her classroom. In this research we have had teachers with a range of attitudes and beliefs regarding ICT and the TELA scheme, and schools providing a wide range of support. The pattern of teachers' use of technology showed that while having either a school culture or personal factors supportive of ICT use had a positive impact, the greatest impact was when the school and personal factors are both conducive to ICT use.

### **7.4 Previous findings**

The findings of this research were generally in line with that of other researchers (for example, Cowie et al, 2008b) examining the effect of the TELA project. Like them, we found that the initial and largest effects were on



administration, with lesser effects on classroom teaching. The first impact seemed to be on teachers' skills, and like our teachers, those involved in Cowie et al's research found that it took longer to achieve goals than they had envisaged. Our research found that leadership played a vital role in terms of providing a supportive context within which teachers could work, and through creating an expectation of ICT use. Cowie et al, however, found that very few teachers recognised leadership as important, although it must be noted that they were being asked to compare this with other factors. We also asked direct questions about the leadership in the school in terms of the scheme, which may have resulted in this factor being identified more strongly by our participants. Nonetheless, our research seems to show that leadership does play a critical role in terms of ICT use in the school, whether it be directly or indirectly.

## 7.5 Research questions

At the start of this research project, we posed three questions. We will conclude this report by revisiting these, providing answers based on the previously discussed findings.

1. Why do primary teachers participate in the TELA initiative? What are their goals and expectations of laptop use?
  - To what extent does having a set of goals and objectives of laptop use affect how and when teachers use the laptop computers?

The primary teachers who participated in this research generally did so at the behest of their school. The Years 1 to 3 teachers were anxious to receive their laptops, as their Years 4 to 6 and Years 7 to 8 colleagues had received laptops in previous rounds. They generally saw the laptops as recognition of them as professionals, and the increasing need for administration to be done electronically. The goals and objectives they had were largely based around planning and administration, or about teaching in general.

There appeared to be a relationship between use of ICT and teachers' goals and objectives for their laptops. However, the goals identified were normally building on current use, and it not clear whether having goals affected use, use affected goals, or whether use and goals interacted.

2. What are the impacts of the TELA initiative on teachers' professional growth and collaboration opportunities, access to, and creation of, quality ICT-based teaching and learning and assessment resources, as well as on their lesson planning, preparation and administration?
  - Are there any changes of attitudes, beliefs, and values of teachers about the use of ICT in teaching and learning as a result of the TELA initiative?
  - What pedagogical approaches do teachers use in their teaching with ICT as a result of an increase in ICT skills and confidence?

The TELA scheme appeared to have the largest impact on teachers' skills, confidence and competence in terms of the use of ICT for administration, preparation and planning. There seemed to be some effect for some teachers, in some schools in terms of use of ICT in teaching, and in particular in terms of pedagogy, but this was less common, and took much longer to occur. In several schools the initial focus was on upskilling staff, followed by enhancing the use of technology for preparation and administration, with these schools now working on using ICT in teaching and learning. It appears that this process takes time and that personal and school factors interact in terms of ensuring it occurs. There seemed to some change in the beliefs and values of teachers about the use of ICT in teaching and learning as a result of the TELA Initiative. Generally these were incremental changes, although some teachers reported having a newfound

understanding of how ICT could be of value in teaching and learning. Again, school factors seemed to impact on whether or not beliefs changed.

3. To what extent has the school supported teachers' participation in the TELA initiative, as reflected in the school's ICT and professional development plans?
  - How important is the school and work culture in affecting teachers' laptop use? In what way does the TELA initiative change the culture of the school?
  - What is the role and importance of the school leadership and planning in fostering change?
  - What, if any, additional demands has the TELA initiative placed on schools, in terms of teachers requiring access to the Internet and network from their classrooms and their homes or access to peripherals such as data projectors and printers?

As part of the scheme, schools were required to provide the necessary infrastructure, professional development and technical support. The amount of support varied between schools and in many cases was insufficient. Many teachers commented on a lack of initial professional development, in terms of understanding the basic features of their laptops. Three of the schools were in ICTPD clusters during the course of the project, and there seemed to be a reliance on this programme for professional development. The other structured professional development that seemed to be provided most often was with regard to schoolwide systems, such as an intranet or school management system. Several schools provided 'just-in-time' support through principals, ICT coordinators and lead teachers, and this seemed to be the most effective in terms of general use.

School factors such as general work culture and leadership appear to have had a large impact on teachers' use of the laptops and ICT. Where ICT use was not expected, fewer teachers used it for a narrower range of tasks. All schools required their teachers to use the laptops for at least some administrative tasks. One school had required the use of the laptop and other forms of ICT in teaching and learning since the TELA project began, with three of the remaining four schools also expecting its use in teaching and learning by the end of this research.

The TELA scheme placed additional demands on the schools and on the individual teachers involved, particularly over time. Generally, schools upgraded their networks as a result of the project, in most cases implementing or extending a wireless network. There was also increased demand for classroom ICT. This demand highlighted issues with current classrooms, as several teachers commented that they would like more classroom computers, but that there was no room to put them.

Many teachers reported working from home more often. This placed additional demands on them, but was also seen as one of the key benefits of the scheme, as it gave them flexibility in their working conditions. In at least one school, the increase in teachers working from home led to them upgrading their intranet, so teachers could have full access to it from home. Teachers also reported needing more and more immediate technical support and professional development, as the improvement in their personal access to technology led to them using it more.

## **7.6 Conclusion**

There is no doubt that the laptops provided by the TELA scheme had become an invaluable and everyday part of these teachers' lives. Although in the first round of interviews some teachers felt they could do without their laptops, this changed. In the final round of interviews teachers felt there was no longer any way they could do their jobs without their laptops, commenting on difficulties they had experienced on occasions when laptops had been out of service owing to technical difficulties. The portable and flexible nature of the laptop was seen as its most valuable feature.

It is difficult to determine the impact of this project as it has not occurred in isolation. Technology use in the world is increasing, and schools have been involved in professional development clusters, all of which may have impacted on the use of ICT. Nevertheless, teachers identified a number of ways they felt that the laptops specifically had impacted on their practice:

- enhanced confidence and motivation, particularly in terms of ICT skills, but also in the use of ICT in teaching and learning
- increasing use for accessing and creating resources, with the types of resources being accessed changing over time to include those such as YouTube videos and interactive sites
- used for administration and planning in ways that were more effective and efficient, although there was often a learning curve associated with this.

Some teachers identified ways in which how they used ICT had changed as a result of the project, with their pedagogy changing to a more student-centred focus.

While there have not been wholesale changes in classroom teaching, the use of ICT in teaching and learning has increased, and it appears the laptop scheme has been an important part of this. Having said that, this research also shows that personal and school factors cannot be overlooked, and must be considered as well.



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# Appendices

## Appendix A: Review of literature relating to nationwide teacher-only laptop initiatives

### Introduction

The Laptops for Teachers Scheme (the TELA scheme) was introduced as one component of the *Digital Horizons Learning through ICT Strategy* introduced by the New Zealand Ministry of Education in 2003. This ongoing, nationwide scheme has provided most permanent teachers in New Zealand with access to a personal laptop for minimal or no cost. Teacher laptops are leased by schools for a three-year period and are replaced at the end of this period.

The provision of laptops for teachers alleviates one of the barriers of using ICT in teaching, that of lack of access for teachers to develop personal skills and to integrate ICT into their teaching practice. Evaluative research has been carried out on various aspects of the TELA scheme since its inception in order to assess its impact on the professional practice of secondary and primary school teachers. This review includes the findings of these reports, as well as comparative evaluative research into the provision of laptops for teachers' schemes that have been initiated in other countries. The review also includes a brief look at the literature which shows the impact of technology on teaching and learning. Annotations of reports of relevant schemes can be found at the conclusion of this review. This is not designed to be a comprehensive review of related literature, but rather provides the reader with details of other similar or relevant initiatives, to provide a context within which to place the TELA scheme and this research.

### International studies and key findings in relation to the TELA scheme

The body of evaluative literature available that assesses the impacts and outcomes of teacher-only laptop schemes is surprisingly limited. Most of the literature available refers to schemes that also include the provision of laptops for students. Whether it is the case that few teacher-only schemes have been initiated or whether research into such schemes has never been considered is not known.

The only other teacher-only laptop schemes to have been extensively evaluated outside the TELA initiative have been in the United Kingdom. The first of the English schemes, begun in 1998, was the *Multimedia Portables for Teacher Pilot Project* (Harrison et al, 1998, see the annotations for a full summary of the evaluation). The *Computers for Teachers* initiative was launched in January 2000 and offered teachers a subsidy of 50% towards the purchase cost of a desktop or laptop computer up to a maximum of £500. Some 6,000 teachers benefited from this scheme. Three evaluation reports were completed for this project (BECTA, 2001, 2002; Kington et al, 2003; see annotations for details of these projects). In 2002 a further scheme was launched, known as the *Laptops for Teachers* initiative (see Cunningham, Kerr, McEune, Smith & Harris, 2004 in annotations). Between 2002 and 2004 the Government provided £120 million that was allocated directly to local education authorities for the purchase and allocation of laptops to teachers and head teachers. Those who benefited from the previous *Computers for Teachers* scheme were ineligible.

The goals for these projects have largely been to facilitate access to technology for teachers; to increase personal skills, capability and motivation; and to assess the impacts that such technology may have on recipients' professional work and teaching, and on student motivation and learning. For most of these initiatives, assessments of the impacts of laptops have occurred during the first year of the initiative. The majority of evaluations have not been designed as longitudinal studies to explore the effects of the technology on teachers' practice over time.

The findings from these reports are positive. The *Multimedia Portables for Teachers* (Harrison et al, 1998) was an extremely successful pilot that the researchers considered effectively changed many teachers' lives. The portables made a transformative difference to teachers at both a personal and professional level. Teachers made fundamental changes to

their ways of working. A very high proportion of teachers (98%) made use of their computer and were motivated to commit many hours of personal time to what was in effect their own professional development. As a result teachers' confidence and competence changed 'radically' for the better, their knowledge of ICT increased 'substantially', and enthusiasm for their work increased. The researchers noted there were also positive benefits for teaching and learning and wider benefits for students and other teachers not involved in the pilot.

Subsequent reports reiterate these findings, albeit in slightly different ways. The *Computers for teachers: An evaluation of Phase 1: Survey of recipients* (BECTA, 2001) investigated teachers' reasons for purchasing a subsidised desktop or laptop computer. Their reasons included a desire by more than 80% of respondents to improve their ability to use a computer, to prepare teaching materials, to use for administration tasks and to access the Internet for work and personal use. This report noted greatly increased use on a daily basis for administrative and teaching tasks, improved personal skills and confidence; a substantial number of teachers believed there was an impact on pupil use, motivation and attainment. In the parallel report *Computers for teachers: A qualitative evaluation of Phase 1* (Kington et al, 2003) teachers in the case-study schools acknowledged the above findings and noted the greater efficiencies experienced in carrying out professional activities such as lesson preparation and administrative tasks. The third report, *Computers for teachers: An evaluation of Phase 2: Survey of recipients* (BECTA, 2002), found that levels of teacher competence and confidence had continued to improve in the 12 months between the surveys. The researchers also reported a continuing improvement in the levels of daily use of computers in teaching and administration, although the rate of improvement had slowed. In addition the researchers reported that laptop users' confidence and experience in most packages was higher than that of desktop purchasers, implying that portability was an important factor in teachers' improvement overall. These findings were to influence the scheme that followed.

One of the aims of the *Laptops for teachers: An evaluation of the first year of the initiative* report (Cunningham et al, 2004) was to assess the impact of personal ownership on teacher improvement with ICT across a range of uses. Many of the previously identified benefits were reiterated in this report but there is considerable refinement evident in defining which professional practices were being supported by laptop technology. The role of laptops in improving teaching and learning was clarified when teachers said they had better access to a greater range of resources, improved access to Internet resources, software and ability to produce better and more cost-effective resources themselves. The laptop was valued as a demonstrational tool, both for developing students' ICT skills and for instructional use with an interactive whiteboard. The role of laptops in supporting administrative tasks was considerable in such areas as planning and preparation of resources, time management and quality of resources produced, as well as assessment, reporting and pupil tracking, class and school management and assisting with teacher workload.

These mostly large-scale reports have limitations. Findings from teachers are joined across both social and professional spectrums. None of the published English reports have differentiated the findings by teaching level or school type nor have possible regional or economic differences been considered. No comparison studies were undertaken with non-selected teachers nor were longitudinal studies commissioned that could investigate the extent to which impacts on practice may change over time. The reports pay limited attention to other wider contexts that may also be constraining or enabling teachers' technology use and to the breadth of teacher professional practices that are supported by laptops.

### The TELA scheme: Findings

The goals of the TELA scheme, stated in the 2004 information pack release, were not dissimilar to the English computers for teachers' initiatives. The New Zealand goals were to develop teacher confidence and competence in the use of ICT for professional growth and collaboration, for teaching and learning, class management and for administration (Ministry of Education, 2004).

To date, a number of both interim and final evaluative reports have been commissioned and published about the TELA scheme. These reports have specifically investigated goal alignment between primary teachers and policy developers, an evaluation of use and impact on secondary schools and on upper level primary schools (Years 7 and 8). The findings from these reports, while largely positive, also indicate that gains in routine use of laptops in many aspects of teachers' professional work have been quite modest over time.

One of the important aspects of the *TELA: Laptops for Teachers Evaluation – Final Report Years 9-13* (Cowie et al, 2008a) was to report specifically on the impact of laptop ownership on changing secondary teachers' professional practice over time. Various aspects of practice have been given more clearly defined shape in this report. A large proportion of secondary teachers were found to be routinely using their laptops for administrative tasks, for accessing a wider range of resources than they have been able to previously, for developing worksheets and other resources and often for collaboratively planning and sharing those resources. By the end of the project the laptop had, for most teachers, become integral to their professional lives. Teachers who had appeared somewhat diffident in 2004, later spoke with confidence about what they could and intended to do. The multimedia capability of laptops affords secondary teachers the opportunity to introduce multi-sensory material into their teaching, acting as a motivator for students to engage creatively and critically in their learning.

*The TELA: Laptops for Teachers Evaluation—Final Report Years 7 & 8* (Cowie et al, 2008b) was commissioned from the same research organisation as the secondary teacher study, allowing for some comparisons to be made between the data from the two projects. What is evident from this report is that a large proportion of Years 7 and 8 primary teachers were routinely using their laptops for administrative tasks, for accessing a wider range of resources than they had been able to previously and often collaboratively planning and sharing those resources. Gains in widespread routine use were variable, indicating substantial change over time in some aspects of use and more modest changes over time in other areas of use. Generally primary teachers had a greater level of comfort with a wider range of applications than their secondary counterparts and were more inclined to use the laptops in the classroom for a wider range of instructional purposes.

These reports indicate that there are some discernable similarities and differences in laptop use between the primary and secondary sectors. The similarities relate to the advantages of laptop use for increasing teacher competence and capability, administrative tasks and use in planning and preparation of teaching materials. There are discernable differences in levels of collegiality evident between the two sectors in the two TELA reports, and also in subject-specific uses of laptops. Some differences are discernable in the ways the laptops have been integrated into instruction. The scope of classroom uses reported by some teachers fits into and aligns with current policies on effective teaching. Nevertheless evidence of substantial pedagogical change on a wider scale is hard to find.

The TELA final evaluation reports indicate that contextual factors need to be considered in any evaluation of the extent of teacher use of laptops. These can be classified as relating to: professional development; school infrastructure and support; and leadership.

Three types of teacher professional development were identified as being important for increasing use. The first was formal professional development. For both secondary and upper-level primary teachers this mostly comprised learning about the school network, using administration programmes, learning about specific software, and beginner computer skills. The second type of professional development identified was collegial. Teachers acknowledged the importance of opportunities to work with more knowledgeable colleagues in sustained ways. The third type was self-exploration of the laptop. Much of this was undertaken at home where teachers could seek help from family and friends.

Hardware, software and technical support were also identified as being a key constraint on secondary teacher usage, and one of the features of the laptop programme for some secondary teachers had been to kick-start slower schools into taking up ICT. Increased teacher access to ICT and professional development led to increased demand for suites of computers for curriculum teaching, and in-class data projectors.

For secondary schools, senior management leadership and support in the use of laptops and ICT was identified as being crucial and that this support needed to come from a range of groups, including Boards of Trustees, the principal and senior management team, ICT coordinator, ICT committees and enthusiastic classroom teachers. School policies and practices were a contributory factor as they determined the incentives and opportunities teachers had to use the laptops. Departmental mentoring and leadership was vitally important at the curriculum level, to encourage development of and sharing of electronic lesson materials and for setting up well organised repositories for resources.

What is particularly interesting is that the respondents in the primary report did not rate school leadership as a particularly important factor in teachers' use of laptops in the classroom when compared with other factors such as school networking, technical assistance, access to equipment and time to experiment.

To summarise the literature in this field we note the dearth of comparable international material available for schemes specifically for teachers and the importance of the earlier English evaluations of laptop ownership by teachers. These evaluations were able to provide valuable evidence that teachers did in fact benefit, personally and professionally, by being provided with laptops for their professional work and that in many tangible ways some of the benefits did flow into instruction. The literature now emerging from the New Zealand investigations into the TELA scheme adds considerably to the literature in the field of teacher portable computer ownership. This literature reveals some expected differences in sector use, but in many respects the picture is a positive one. The impacts on streamlining national, school and classroom administration have been rapid and are substantial. So are the effects on preparation of teaching materials and resources. Slower to change is the use of laptops in teaching practices, but there is evidence that teacher demand for peripherals to extend laptop use, ubiquitous networking, technical support and higher levels of student access to computers is growing.

#### **Annotated bibliography: Summaries of evaluation research into nationwide laptops for teachers' initiatives**

Summaries provided here:

1. BECTA (2001) Computers for teachers: An evaluation of Phase 1: Survey of recipients
2. BECTA (2002) Computers for teachers: An evaluation of Phase 2: Survey of recipients
3. Cowie et al (2008b) TELA: Laptops for Teachers Evaluation – Final Report Years 7 & 8
4. Cowie et al (2008a) TELA: Laptops for Teachers Evaluation – Final Report Years 9-13
5. Cunningham et al (2004) Laptops for teachers: An evaluation of the first year of the initiative
6. Harrison et al (1998) Multimedia portables for teachers pilot
7. Kington et al (2003) Computers for teachers: A qualitative evaluation of Phase 1

BECTA. (2001). <i>Computers for teachers: An evaluation of Phase 1: Survey of recipients</i> . NGfL research and evaluation series. Retrieved August 13, 2009, from <a href="http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598">http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Survey (random section process) and analysis of outcomes
<b>Name of initiative</b>	Computers for teachers (CFT)
<b>Location of initiative</b>	England
<b>Schools involved:</b>	Variety
<b>Description of initiative scope</b>	28,000 teachers purchased computers under the first phase between January and July 2000.
<b>Initiative goals</b>	A government initiative aimed at helping teachers in England raise standards by enabling them to have access to a personal computer.
<b>Timeframe for initiative</b>	January to July 2000
<b>Funding and business partnerships</b>	Government subsidy for teachers to purchase own laptops
<b>Description of evaluation focus and sample</b>	<p><i>Aim</i> To assess</p> <ol style="list-style-type: none"> <li>1. effect of laptop ownership on ICT skills and confidence</li> <li>2. impact that teachers' personal access to ICT has on teaching and learning</li> </ol> <p><i>Sample</i> Questionnaires sent to a random sample of 6,000 teachers who benefited from the scheme. 2,558 completed questionnaires analysed.</p>
<b>Timeframe of evaluation</b>	May – Dec 2001
<b>Evaluation methods and indicators</b>	<p>Survey of eligible teachers Reasons for purchase Measuring effects on</p> <ol style="list-style-type: none"> <li>1. Administration</li> <li>2. Teaching</li> <li>3. Pupils</li> <li>4. Teachers' skill levels</li> <li>5. Teachers' access to ICT</li> </ol>
<b>Evaluation outcomes and findings</b>	<p>Reasons for purchase included (multiple answers by respondents)</p> <ul style="list-style-type: none"> <li>• improve ability in use of computer (80%)</li> <li>• to prepare teaching materials (87%)</li> <li>• administration tasks (80%)</li> <li>• access to the Internet for work (86%) and personal use (84%).</li> </ul> <p>Increased daily use for admin by almost 150% Increased daily use in teaching by almost 150% Impact on pupils use, motivation, and attainment was believed by 18%-29% of teachers to have improved by a substantial extent and by 42%-45% of teachers to be quite substantial. Increase in teacher skills was believed to be substantial for 71% of responses.</p>
<b>Implications authors</b>	None provided
<b>Implications reviewers</b>	Large sample. Obvious benefits in personal ownership of portable laptops for teachers. Clearly teacher goals were met in this project. Method of assessing impact on students' use, motivation and attainment was via teacher opinion.

BECTA. (2002). <i>Computers for teachers: An evaluation of Phase 2: Survey of recipients</i> . ICT in schools research and evaluation series (13). Retrieved August 13, 2009 from <a href="http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598">http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Survey and analysis of outcomes
<b>Name of initiative</b>	Computers for teachers (CFT)
<b>Location of initiative</b>	England
<b>Schools involved:</b>	Variety
<b>Description of initiative scope</b>	28,000 teachers purchased computers under the first phase between January and July 2000.
<b>Initiative goals</b>	A government initiative aimed at helping teachers in England raise standards by enabling them to have access to a personal computer.
<b>Timeframe for initiative</b>	January to July 2000
<b>Funding and business partnerships</b>	Government subsidy for teachers to purchase own laptops
<b>Description of evaluation focus and sample</b>	<i>Aims:</i> Determine how teachers' views and use of ICT changed as a result of the scheme one year after delivery of their laptops. <i>Sample:</i> 970 completed questionnaires were returned from 1494 teachers who had completed the baseline survey agreed to take part in further research
<b>Timeframe of evaluat<sup>n</sup></b>	August - Dec 2002
<b>Evaluation methods and indicators</b>	Survey of eligible teachers who volunteered to commit to further research Purchasing and Servicing Reasons for purchase Measuring effects on <ol style="list-style-type: none"> <li>1. Administration</li> <li>2. Teaching</li> <li>3. Pupils</li> <li>4. Teachers skill levels</li> <li>5. Teachers access to ICT</li> </ol>
<b>Evaluation outcomes and findings</b>	Three mains reasons for purchase included (multiple answers by respondents) <ul style="list-style-type: none"> <li>• to prepare teaching materials (92%)</li> <li>• administration tasks (86%)</li> <li>• access to the Internet for work (85%).</li> </ul> Evidence of further increases in daily use for admin and daily use in teaching Impact on pupils' use, motivation and attainment was believed by 18%-29% of teachers to have improved by a substantial extent and by 42%-45% of teachers to be quite substantial. Increase in teacher skills was believed to be substantial for 71% of respondents.
<b>Implications authors</b>	Reported levels of teacher competence and confidence have improved in 12 months between the surveys. Reported levels of daily use of computers in teaching and administration improved but that rate slowed compared to initial use. Reported increased confidence and experience in most packages by laptop users higher than desktop purchasers.
<b>Implications reviewers</b>	Improvements in teachers' skills and confidence having a long-term effect.

Cowie, B., Jones, A., Harlow, A., McGee, C., Cooper, B., Forret, M., Miller, T., & Gardiner, B. (2008a) <i>TELA: Laptops for Teachers Evaluation—Final Report Years 9-13</i> . Wellington, New Zealand: Ministry of Education. Retrieved August 14, 2009 from <a href="http://www.educationcounts.govt.nz/publications/ict/27370/24604">http://www.educationcounts.govt.nz/publications/ict/27370/24604</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Process and outcomes
<b>Name of initiative</b>	Laptops for Teachers Scheme (TELA Scheme)
<b>Location of initiative</b>	New Zealand
<b>Schools involved: type and size</b>	Initially TELA was a phased scheme, but by July 2005 all schools could apply to access laptops for all their teachers from Years 1 - 13 on the condition they manage the integration of the laptops into the school environment; this includes providing and meeting the costs of additional ICT infrastructure, professional development and technical support.
<b>Description of initiative scope</b>	Permanent full-time and part-time teachers in state and integrated schools working with Year 1 to 13 classes for at least 50% FTE are eligible to apply. Approved applicants are reimbursed for approximately two-thirds of the costs of leasing a laptop leaving a deficit of around \$7 per week to be paid by the applicant or the school board of trustees.
<b>Initiative goals</b>	To provide a teaching tool to all New Zealand teachers, ensuring the development of greater confidence and competence in the use of technology in ICT.
<b>Timeframe for initiative</b>	Started 2003 and ongoing. Rolling replacement of laptops occurs for individual teachers every three years.
<b>Funding and business partnerships</b>	New Zealand Government
<b>Description of evaluation focus and sample</b>	<i>Focus:</i> Longitudinal investigation of the impacts of the TELA Scheme on teachers' work, and evidence of emerging changes in laptop use. <i>Sample:</i> Secondary teachers.
<b>Timeframe of evaluation</b>	Four years 2003-2006
<b>Evaluation methods and indicators</b>	Mixed methods approach: <ul style="list-style-type: none"> <li>• six focus groups of teachers in face-to-face meetings</li> <li>• a questionnaire sent to teachers in a range of schools</li> <li>• case studies of eight schools participating in the TELA scheme.</li> </ul> <p>The focus groups allowed teachers to talk about their experiences and changes in their use of the laptop over the three years. Each year, teachers from 20 focus group secondary schools met in five regions. The annual questionnaire asked teachers about various aspects of their experience with the laptops, including school support for laptops, professional development, their use of laptops at home and in school, and their goals for future use.</p>
<b>Evaluation outcomes and findings</b>	One of the important outcomes of this report was to investigate longitudinal changes occurring to specific teacher practices. <ul style="list-style-type: none"> <li>• Changes in self-perceptions of expertise and comfort levels with basic applications such as word processing, email and Internet searches proved to be modest over time.</li> <li>• Increased use in a range of administration tasks was evident over the three years starting with more than 50%, increasing to more than 65% of teachers, routinely using laptops for report writing, recording grades, checking lists and records.</li> <li>• Evidence of increased routine-use of laptops for communication was also modest. Email was mostly used for communicating with colleagues but by 2005 there was some evidence of communications being extended to include parents and students. Also by 2005 about one-quarter of teachers were occasionally involved in online discussions.</li> <li>• Use of laptops to prepare resources such as handouts, Internet and assessment items, and review resources for student use showed an increase in routine use and a drop in occasional use, signaling that many more teachers were</li> </ul>

	<p>accessing a wider range of teaching and learning materials when preparing for their classes. By 2005 over three-quarters of teachers were using their laptops for this purpose.</p> <ul style="list-style-type: none"> <li>• Use of laptops in the classroom for teacher access to the Internet, class presentations and use of software also showed modest gains although most of these gains were in the area of occasional use rather than routine use. By 2005 there were still fewer than 1 in 6 teachers using their laptops routinely in the classroom and considerably less than half, using them occasionally.</li> </ul> <p>Teachers reported:</p> <ul style="list-style-type: none"> <li>• that they now had flexibility of time and place for working</li> <li>• on the improved access to resources afforded by TELA laptop ownership. For most teachers, the laptop was now integral to their professional lives. Teachers who had appeared somewhat diffident in 2004 spoke with confidence about what they could and intended to do</li> <li>• how the laptop had helped them to become more confident in the use of ICT.</li> </ul> <p>Contextual factors reported that were enablers or constraints:</p> <ul style="list-style-type: none"> <li>• Professional development tended to be mostly based on learning about the technology. Experiences of curriculum PD mainly from in-school mentors. Self-exploration an important factor.</li> <li>• School infrastructure and support very important. Access to school networks and Internet limited for half the teachers. Access to data projectors supports teacher use in the classroom.</li> <li>• School leadership and policies in place for use were important.</li> </ul>
<b>Implications authors</b>	<ul style="list-style-type: none"> <li>• School leaders adopt a 'systems' approach to the development of policy and practices to initiate, extend and sustain the integration of the laptops/ICT into school and teacher work.</li> <li>• Develop a vision and expectation for ICT use in the school.</li> <li>• Model the active use of ICT and if this is not possible, provide suitable support for ICT use.</li> <li>• Foster a collaborative culture around ICT use and innovation within departments and across the school (learning community).</li> <li>• Provide opportunities and time for professional learning, particularly in the areas of teaching and learning with ICT.</li> <li>• Ensure that the school infrastructure is robust, reliable and accessible, this to include ICT technical support, workroom and classroom access, home access to school network, shared drives and a user-friendly and reliable administration system.</li> </ul>



Cowie, B., Jones, A., Harlow, A. with Forret, M., McGee, C., & Miller, T. (2008b). <i>TELA: Laptops for teachers evaluation—Final report Years 7 &amp; 8</i> . Wellington, New Zealand: Ministry of Education. Retrieved August 14, 2009 from <a href="http://www.educationcounts.govt.nz/publications/ict/27369/3">http://www.educationcounts.govt.nz/publications/ict/27369/3</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Process and outcome
<b>Name of initiative</b>	TELA Scheme
<b>Location of initiative</b>	New Zealand – nationwide
<b>Schools involved: type and size</b>	Primary and secondary teachers
<b>Description of initiative scope</b>	Permanent full-time and part-time teachers in state and integrated schools working with Year 1 to 13 classes for at least 50% FTE are eligible to apply. Approved applicants are reimbursed for approximately two-thirds of the costs of leasing a laptop leaving a deficit of around \$7 per week to be paid by the applicant or the school board of trustees.
<b>Initiative goals</b>	To provide a teaching tool to all New Zealand teachers, ensuring the development of greater confidence and competence in the use of technology in ICT. Scheme goals include <ul style="list-style-type: none"> <li>• collaboration and communication</li> <li>• administration and management</li> <li>• lesson planning and preparation</li> <li>• classroom use.</li> </ul>
<b>Timeframe for initiative</b>	Started 2004 – Initiative is ongoing
<b>Funding and business partnerships</b>	New Zealand government
<b>Description of evaluation focus and sample</b>	<i>Focus:</i> Longitudinal investigation of the impacts of the TELA Scheme on teachers' work and evidence of emerging changes in laptop use. <i>Sample:</i> Years 7 and 8 teachers in full primary and intermediate schools.
<b>Timeframe of evaluation</b>	Three years 2004-2006
<b>Evaluation methods and indicators</b>	Two focus groups of teachers in face-to-face meetings Held alternate years – one meeting for full primary Years 7 and 8 teachers and following year intermediate teachers. Survey of teachers – annually
<b>Evaluation outcomes and findings</b>	One of the important outcomes of this report was to investigate longitudinal changes occurring to specific teacher practices. Increased confidence and expertise with ICT in many teachers <ul style="list-style-type: none"> <li>• Increased use of laptops to strengthen collegial relationships. By 2006 three-quarters of teachers used email for communication with colleagues. Increases in teacher use of laptops for accessing the Internet for professional readings (2004–69%: 2005–80%; 2006–91%). For collaboration in developing units and lesson materials. (2004–58%: 2005–70%; 2006–82%).</li> <li>• Efficiencies gained in lesson planning, preparation, administration and reporting. Most prevalent uses -Writing achievement reports (up to 90% from 69% in 2004), record student grades (up to 62% from 47% in 2004). Two-thirds of teachers used laptops for taking notes at meetings.</li> <li>• Growing use of laptops for classroom practice and student learning activities. Increased connectivity (2004–66%: 2005–70%; 2006–79%). Used to develop materials that had real-world and up to date examples and visuals. Use of planning templates and shared folders and resources was widespread. Laptops were proving flexibility in time and place for planning and preparation of teaching.</li> </ul> <p>At the end of three years almost two-thirds of teachers made use of the laptop for classroom practice. Most of this use was 'occasional use' By 2006 57% of teachers used their laptop with a data projector and 5% had used an interactive whiteboard in the classroom. The most prevalent use (91%) of the laptop and peripherals was to present visual material, both static and dynamic, as part of instruction to the class.</p>
<b>Implications authors</b>	The area of immediate concern identified in this evaluation is the need for professional

	<p>learning opportunities with a focus on the pedagogies that would enable the best use of laptops/ICT at the Years 7 and 8 level.</p> <p>Teachers' goal to learn more about ICT as a tool in teaching has increased over the period of the evaluation. (In 2004 37% of teachers set this as a goal, by 2005 this was 45% of teachers and by 2006 this was 46% of teachers).</p>
<b>Implications reviewers</b>	<p>This is a report on the effects of the TELA scheme on primary teachers. As such this report differs from others in that it focuses on primary sector teachers' responses as distinct from secondary (as in the previously noted TELA report) or combined across the compulsory education sector reports (as in the BECTA reports).</p>

Cunningham, M., Kerr, K., McEune R., Smith, P. & Harris, S. (2004). <i>Laptops for teachers: An evaluation of the first year of the initiative</i> . ICT in schools research and evaluation series (19). London: DfES. Retrieved August 14, 2009, from <a href="http://publications.becta.org.uk/display.cfm?resID=25838">http://publications.becta.org.uk/display.cfm?resID=25838</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Process and outcomes
<b>Name of initiative</b>	Laptops for Teachers (Lft)
<b>Location of initiative</b>	England
<b>Schools involved: type and size</b>	Variety
<b>Description of initiative scope</b>	In the first two years of the initiative Lft the government provided £120 million to Local Education Authorities (LEAs) for the purchase of laptops. The LEAs allocated the laptops to schools who owned them and then allocated them to selected teachers on long-term loan.
<b>Initiative goals</b>	Increase teachers' and headteachers' access to computers.
<b>Timeframe for initiative</b>	Launched Spring 2002
<b>Funding and business partnerships</b>	Government
<b>Description of evaluation focus and sample</b>	<p><i>Aims:</i></p> <ul style="list-style-type: none"> <li>• Assess impact of laptop ownership on</li> <li>• recipients' teaching and administration practices and use of resources</li> <li>• recipients' ICT competence, confidence and motivation</li> <li>• recipients' perceptions of the value of ICT in teaching and learning</li> <li>• student motivation and attainment</li> <li>• recipients' workload</li> <li>• portability and security, health and safety</li> <li>• recipients' communication, sharing of information with colleagues, students, parents, governors within and beyond the school</li> </ul> <p><i>Sample:</i></p> <ul style="list-style-type: none"> <li>• LEAs</li> <li>• Head teachers</li> <li>• Participant teachers and ICT coordinators</li> </ul>
<b>Timeframe of evaluation</b>	First year of initiative – 2002
<b>Evaluation methods and indicators</b>	<p>Mixed method approach. Both quantitative and qualitative</p> <ul style="list-style-type: none"> <li>• Surveys Baseline and follow up</li> <li>• Telephone interviews</li> <li>• Case study schools</li> </ul>
<b>Evaluation outcomes and findings</b>	<p>Impacts on teaching and learning</p> <ul style="list-style-type: none"> <li>• Key finding was better access to a greater range of resources, improved access to Internet resources, software and ability to produce better cost-effective resources themselves.</li> <li>• Valued as a demonstrational tool for developing students' ICT skills</li> <li>• Increase in confidence from 65% before to 74% after receipt of laptops</li> <li>• Increased motivation to use laptops in own teaching especially in conjunction with IWB.</li> <li>• Many teachers moving on to explore other technologies that could enhance teaching.</li> <li>• Portability has meant more flexibility in determining when and where to work.</li> </ul> <p>Impacts on administration</p> <ul style="list-style-type: none"> <li>• Extensive impact on planning and preparation of resources, in terms of time management and quality of resources produced.</li> <li>• Extensive impact on assessment, reporting and pupil tracking, class and school management and teacher workload.</li> </ul> <p>Whole-school impact</p> <ul style="list-style-type: none"> <li>• Allocation to senior management had enabled them to use ICT in the development of school systems.</li> <li>• Helped teachers with their management tasks such as policy writing and</li> </ul>

	<p>departmental planning.</p> <ul style="list-style-type: none"> <li>• Greater levels of communication between colleagues, (22% reported this as a main benefit), students, parents and governors.</li> <li>• Important benefit was streamlining whole-school internal procedures. Head teachers better able to ensure consistency of procedures throughout their schools.</li> <li>• Teachers had become more effective in finding ways to manage paperwork.</li> </ul>
<b>Implications authors</b>	<p>The need for funding for additional equipment (peripherals, such as data projectors) to enhance laptop use was becoming evident.  A need for training for specific classroom use rather than general use.  Need to ensure that a balanced workload for teachers is maintained.</p>

Harrison, C., Youngman, M., Bailey, M., Fisher, T., Phillips, R., & Restorick, J. (1998). <i>Multimedia portables for teachers pilot</i> . Retrieved October 7, 2002, from <a href="http://www.becta.org.uk/research/reports/portableict.html">http://www.becta.org.uk/research/reports/portableict.html</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Outcomes
<b>Name of initiative</b>	Portable Multimedia Computers
<b>Location of initiative</b>	England
<b>Schools involved: type and size</b>	Primary and Secondary teachers
<b>Description of initiative scope</b>	Phase I comprised a £5 million project where 1150 teachers in 575 primary and secondary schools were provided with multimedia portable computer and connectivity, Internet subscriptions, core software and a number of CD titles. Phase II scope unknown.
<b>Initiative goals</b>	This pilot project sought to develop teacher competence and confidence in the use of IT.
<b>Timeframe for initiative</b>	Phase I of the project ran from January 1996 to July 1997 Phase II ran from January 1997 to July 1998
<b>Funding and business partnerships</b>	The Department for Education and Employment (DfEE) and National Council for Educational Technology (NCET)(now BECTA).
<b>Description of evaluation focus and sample</b>	<i>Aims:</i> <ul style="list-style-type: none"> <li>• increase teacher confidence and competence in the use of IT resources</li> <li>• promote learning in the pupils taught by the teachers taking part in the project.</li> </ul> <i>Sample:</i> Teachers
<b>Timeframe of evaluation</b>	First year of pilot
<b>Evaluation methods and indicators</b>	Mixed methods <ul style="list-style-type: none"> <li>• Individual surveys administered at 3 months and 8 months into the academic year.</li> <li>• Interviews with teachers in case-study schools</li> </ul>
<b>Evaluation outcomes and findings</b>	A very high proportion of teachers (98%) made use of their computer. Teachers' confidence and competence changed 'radically' for the better. Teachers felt their knowledge of ICT had increased 'substantially'. Teachers changed their ways of working. Teachers' enthusiasm for their work increased. There were positive benefits for teaching and learning. There were wider benefits for students and other teachers.
<b>Implications authors</b>	The pilot has been an extremely successful one and it has changed many teachers' lives. The portables had made a transformative difference to teachers at both a personal and professional level. Teachers made fundamental changes to their ways of working. Many hours of personal time was committed to what was in effect teachers' own professional development.

Kington, A., Harris, S., Smith, P., & Hall, M. (2003). <i>Computers for teachers: A qualitative evaluation of Phase 1</i> . ICT in schools research and evaluation series (14). London: Department for Education and Skills. Retrieved August 13, 2009, from <a href="http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598">http://partners.becta.org.uk/index.php?section=rh&amp;rid=13598</a>	
<b>Type of Report</b>	Research report
<b>Type of Evaluation</b>	Parallel evaluation of themes to support survey data for BECTA (2001a). Case studies.
<b>Name of initiative</b>	Computers for Teachers (CfT)
<b>Location of initiative</b>	England
<b>Schools involved: type and size or teachers</b>	7 primary schools and 1 secondary school.
<b>Description of initiative scope</b>	28,000 teachers purchased computers under the first phase between January and July 2000.
<b>Initiative goals</b>	A government initiative aimed at helping teachers in England raise standards by enabling them to have access to a personal computer.
<b>Timeframe for initiative</b>	January to July 2000
<b>Funding and business partnerships</b>	Government subsidy for teachers to purchase own laptops
<b>Description of evaluation focus and sample</b>	<p><i>Aims</i> Investigate the effects of personal teacher ownership of computers on teacher confidence and competence in using and teaching with ICT. Identify improvements in the teaching and learning process derived from ownership of a personal computer.</p> <p><i>Sample</i> 24 beneficiaries of scheme (non case-study-school teachers) interviewed. 20 teachers involved from 8 case-study schools also interviewed.</p>
<b>Timeframe of evaluation</b>	Spring 2002
<b>Evaluation methods and indicators</b>	Multi-method approach using telephone interviews and analysing case studies.
<b>Evaluation outcomes and findings</b>	<p>Greater efficiencies in carrying out professional activities such as lesson preparation and administrative tasks.</p> <p>Improved levels of ICT competence and confidence making teachers more likely to use ICT in their lessons.</p> <p>Increased access to ICT and the Internet.</p> <p>Increased opportunities for pupils to use ICT themselves in lessons and to use resources their teachers have prepared using ICT.</p> <p>Contributions to whole-school ICT development by improving knowledge skills and access of some of the teachers.</p>
<b>Implications authors</b>	None provided
<b>Implications reviewers</b>	<p>Not enough evidence provided to ascertain whether whole school benefits noted by researchers were owing solely to the laptop scheme or whether other factors such as NOF training options and gradually increasing levels of ICT resources available in schools also had an impact.</p> <p>This research is based on a very small sample of the total number of teachers who were involved in the scheme.</p>

## **Appendix B: Timeline of the evaluation project**

### **15 October 2004–31 March 2005**

Planning meeting with Ministry of Education

Finalise research plan

Ethics approval

Pilot study conducted

*31 March 2005*                      *Progress report*

### **1 April 2005–31 August 2005**

Conduct baseline interviews (Years 4-8)

Develop personal goals for laptop with teachers (Years 4-8)

Interviews – Principals and ICT coordinators

Goals and objectives statements collected from participants (Years 4-8)

*31 August 2005*                      *Progress Report*

### **1 September 2005–31 March 2006**

Commence second interviews (March, Years 4-8)

Commence baseline interviews (March, Years 1-3)

Develop personal goals for laptops with teachers (Years 1-3)

Goals and objectives statements collected from participants (Years 1-3)

Review teacher goals and objectives (Years 4-8)

Focus group interviews (Years 4-8)

*31 March 2006*                      *Progress Report*

### **1 April 2006–31 July 2006**

Finish second teacher interviews (April, Years 4-8)

Finish baseline teacher interviews (April, Years 1-3)

Transcribe interviews (Years 1-8)

Analyse interview data (Years 1-8)

Commence class observations (Years 4-8)

Draft interim report

*31 July 2006*                      *First Interim Report*

### **1 August 2006–31 March 2007**

Finish classroom observations (Years 4-8)

Third teacher interviews (Years 4-8)

Second teacher interviews (Years 1-3)

Focus group interviews (Years 1-8)

Review teachers' goals and objectives (Years 1-8)

Transcribe interviews (Years 1-8)

Analyse observations and interviews (Years 1-8)

*31 March 2007*                      *Progress Report*

**1 April 2007–31 July 2007**

Commence classroom observations (Years 1-8)

Focus group interviews (Years 1-8)

Draft interim report

*31 August 2007*                      *Second Interim Report*

**1 August 2007–30 June 2008**

Classroom observations (Years 1-8)

Fourth teacher interviews (Years 4-8)

Third teacher interviews (Years 1-3)

Focus group interviews (Years 1-8)

Review teachers' goals and objectives (Years 1-8)

Transcribe interviews (Years 1-8)

Analyse observations and interviews (Years 1-8)

Draft interim report

*30 June 2008*                      *Third Interim Report*

**1 July 2008–30 April 2009**

Classroom observations (Years 1-3)

Fourth teacher interviews (Years 1-3)

Focus group interviews (Years 1-3)

Review teachers' goals and objectives (Years 1-3)

Analyse observations and interviews (Years 1-3)

**1 May 2009–30 September 2009**

Complete analysis of data

Draft final report

*30 September 2009*                      *Final Report*



## **Appendix C: Classification of schools**

### **Rural**

A rural school is located in a town with only one primary school and no secondary school. Examples of rural towns include:

- Totara
- Glenorchy
- Lee Stream
- Omakau

### **Provincial**

A provincial school is located in a town where there is at least one primary school and at least one secondary school. The research team was able to invite a school from towns such as:

- Balclutha
- Alexandra
- Queenstown
- Oamaru

### **Urban**

An urban school is located within the boundaries of a city, in this case Dunedin.

## **Appendix D: Themes and open-ended questions used as guides in interviews**

### Principal

- What percentage of teachers in school have a TELA laptop?
- Do any teachers have a laptop other than those provided by TELA?
- What other computers do you have in the school? (Number, location)
- What other hardware is owned by school (ie, projectors, whiteboards, digital camera, video camera, etc.), and where is it located?
- What role do you play, in terms of the ICT at school?
- Who else has a role, and what is that role?
- What responsibilities have you had and do you have for implementing the TELA scheme at your school?
- Does anyone else have any responsibilities for this?
- What sort of policy decisions have you had to make regarding acceptable uses of laptops for teachers?
  - how much collaboration was involved?
  - how constrained were you by Ministry requirements?
- What changes have you had to make to incorporate the use of laptops by the teaching staff?
  - school network
  - other hardware
  - professional development
  - anything else?
- How has it affected your role in the school?
  - more technical support?
  - more software support?
- What professional development opportunities, if any, have you had in relation to the introduction of laptops in your school?
- Do you think that having the laptops has affected the work culture in your school?
  - in what ways?
- Do you think that having the laptops has affected the way your teachers teach?
  - in what ways?
- How important do you think your leadership has been in this project?

- Does the school have a technology plan or strategy? What does it refer to? (any of the following: Professional Development in terms of teaching using ICT; IT Training for staff; Internet policy; Home usage policy; Replacement of laptops; Purchasing of future equipment/software; Technical Support; Student usage policy; Health, safety, ethical issues)
  - Has it changed in any way due to the laptops?
- Overall, what do you think the impact of the laptop project has been on your school, the teachers and the students?
- What do you think should be the future of the scheme? Do you think it should continue, and should any changes be made?

#### ICT coordinator

- What percentage of teachers in school have a TELA laptop?
  - Do any teachers have a laptop other than those provided by TELA?
- What other computers do you have in the school? (Number, location)
  - What other hardware is owned by school (i.e. projectors, whiteboards, digital camera, video camera, etc.), and where is it located?
- What role do you play, in terms of the ICT at school?
  - Who else has a role, and what is that role?
- What responsibilities have you had and do you have for implementing the TELA scheme at your school?
  - Does anyone else have any responsibilities for this?
- What sort of policy decisions have you had to make regarding acceptable uses of laptops for teachers?
  - how much collaboration was involved?
  - how constrained were you by Ministry requirements?
- What changes have you had to make to incorporate the use of laptops by the teaching staff?
  - school network
  - other hardware
  - professional development
  - anything else?
- How has it affected your role in the school?
  - more technical support?
  - more software support?
- What professional development opportunities, if any, have you had in relation to the introduction of laptops in your school?

- Do you think that having the laptops has affected the work culture in your school?
  - in what ways?
- Do you think that having the laptops has affected the way your teachers teach?
  - in what ways?
- How important do you think your leadership has been in this project?
- Does the school have a technology plan or strategy? What does it refer to? (any of the following: Professional Development in terms of teaching using ICT; IT Training for staff; Internet policy; Home usage policy; Replacement of laptops; Purchasing of future equipment/software; Technical Support; Student usage policy; Health, safety, ethical issues)
- Has it changed in anyway due to the laptops?
- Overall, what do you think the impact of the laptop project has been on your school, the teachers and the students?
- What do you think should be the future of the scheme? Do you think it should continue, and should any changes be made?

#### Teachers

- What year level are you currently teaching?
- Do you have the same laptop you had as when we talked to you last year? (If yes, skip section. If no, ask following questions.)
  - how much choice did you have in getting this particular laptop
  - what features were you most concerned to have access to
  - hardware
  - software
  - connectivity
- What, if any, are the personal gains and costs to you from this participation? How about in terms of
  - time
  - resources
- What sort of policies or procedures govern your use of the laptop?
  - which of these expectations are Ministry based, which are school based and do any result from personal choice?
    - restrict laptop to school use
    - illegal nature restrictions
    - game playing
  - how were these made clear to you, did you have to sign anything?

- evaluate these acceptable use policies, how fair and reasonable do you think they are?
  - what ways, if any, do you think they should be adapted to fit practical requirements?
- When something goes wrong with your laptop, what support is there to remedy it?
- Who do you ask if you have any technical difficulties with use
  - hardware
  - software
- How would you describe the levels of technical support from school?
- Could you describe the leadership support that you have had regarding the TELA scheme
  - improvements?
- What professional development opportunities have you had related to laptop use since starting the scheme
- How would you describe the work culture in your school
  - collaborate in what ways
  - producing resources
  - team teaching
  - committee work
- What further support would you like to have for laptop and ICT use in your school?
  - hardware
  - software
  - professional development
  - networks
  - communication
- How do you use your laptop in your teaching?
- At home, can you connect to school network if have one?
  - email
  - library catalogue
  - school database
  - at school
  - student use
  - administrative use
  - curriculum use

- Do you see a continuing need for use of your laptop
  - in particular which features do you see as essential
- How do you think having access to and use of your laptop has affected ICT use in your teaching?
- Last time we talked with you, we asked about your goals and objectives. Do you think you have realised these?
- Over the next 3 terms what would you like to achieve in the following areas?
  - ICT skills
  - lesson planning
  - ICT in school curriculum
  - school administration
  - own professional development and professional learning
  - teaching materials and resources to develop
  - ways of working with teaching colleagues in this school
  - ways of working with teaching colleagues in other schools and the wider community
  - leisure activities

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## Appendix E: Needs assessment – goals and objectives statements

1. Please list (2-3) some of the major goals or objectives you would like to achieve towards *developing your students' ICT skills*:  
How will you use your laptop to help achieve this?
2. Please list (2-3) some of the major goals or objectives you would like to achieve towards *lesson planning*:  
How will you use your laptop to help achieve this?
3. Please list (2-3) some of the major goals or objectives you would like to achieve towards *integrating ICT in the school curriculum*:  
How will you use your laptop to help achieve this?
4. Please list (2-3) some of the major goals or objectives you would like to achieve towards *administration*:  
How will you use your laptop to help achieve this?
5. Please list (2-3) some of the major goals or objectives you would like to achieve towards your *own professional development and professional learning*:  
How will you use your laptop to help achieve this?
6. Please list (2-3) some of the major goals or objectives you would like to achieve towards *research and development of teaching materials and resources*:  
How will you use your laptop to help achieve this?
7. Please list (2-3) some of the major goals or objectives you would like to achieve towards *ways of working with teaching colleagues in this school*:  
How will you use your laptop to help achieve this?
8. Please list (2-3) some of the major goals or objectives you would like to achieve towards *ways of working with teaching colleagues in other schools and the wider community*:  
How will you use your laptop to help achieve this?
9. Please list (2-3) some of the major goals or objectives you would like to achieve towards *communicating with others*:  
How will you use your laptop to help achieve this?

**Appendix F: Focus group interview questions**

- What are the benefits and costs in having a TELA laptop? Personal? Professional?
- How would you describe the levels of technical support from school?
- What further support would you like to have for laptop and ICT use in your school?
- How do you use your laptop in your teaching?
- Do you see a continuing need for use of your laptop? What are the essential features?
- Do you think having access to your laptop has affected ICT use in your teaching? How?
- Do you believe that ICT use makes a difference in your teaching and your students' learning?
- Are you happy with the way you've been using your laptop?
  - Why? Student response? Using it to the best you can?
  - Why not? What will you need to get there?