MINISTRY OF EDUCATION NEW ZEALAND
Te Tāhuhu o te Mātauranga Aotearoa

Laptops for Teachers: An evaluation of the TELA scheme in schools (Years 1 to 3)

Report to the Ministry of Education

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newzealand.govt.nz

Research & Evaluation

ISBN: 978-0-478-34258-1

Web Copy ISBN: 978-0-478-34259-8

RMR-946

Research reports are available on the Ministry of Education's website Education Counts: www.educationcounts.govt.nz/publications.

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LAPTOPS FOR TEACHERS: AN EVALUATION OF THE TELA SCHEME IN SCHOOLS (YEARS 1 TO 3)

Final Report

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Acknowledgements

Research of the kind outlined in this report involves a considerable number of teachers in a number of schools. The research team is grateful for the willingness of school principals to encourage teachers to take part; and grateful to the hundreds of classroom teachers who have been willing to share their experiences in relation to the TELA scheme to provide laptops for teachers.

This evaluation team has appreciated the ongoing contact with the schools and teachers in this evaluation project. Teachers have a unique opportunity to tell the stories of their emerging experiences with their laptops. This valuable information will have an important part in informing (and hopefully enhancing) future policies and practices, ultimately to the benefit of school students and teachers, families and the wider community.

Executive Summary

The purpose of this evaluation is to investigate the impacts of the Laptops for Teachers Scheme: TELA (referred to from here as the TELA scheme) on teachers' work over a period of three years (2006, 2007, 2008) and to record emerging changes in laptop use. This evaluation report presents findings from the three annual cycles of national focus groups and questionnaires with Years 1 to 3 teachers in New Zealand primary schools.

In this evaluation, two methods of data collection were used: first, three focus groups were held with teachers in face-to-face meetings and second, a questionnaire was sent to teachers in a range of schools. The focus groups allowed teachers to talk about changes in their use of the laptop over the three years. Focus groups were held in the Taranaki, Wellington and Marlborough areas. The questionnaire asked teachers about various aspects of their laptops experience, including school support for laptops, professional development, their use of laptops at home and in school, and their goals for future use. In this final report, questionnaire results are presented together with the results from the focus groups held over three years.

Main findings

Teachers' perceptions changed over the three-year period from thinking of the laptop as an extra computer in the classroom or as a teacher's administrative tool, to seeing the laptop as a way of increasing student motivation and engagement, and provided students with another way to learn.

The evidence in this report demonstrates that the implementation of the Laptops for Teachers scheme has resulted in progress towards the achievement of goals for this initiative. It indicates:

1. Increasing confidence and expertise with ICT for many teachers
2. Growing use of laptops for classroom practice and student learning activities
3. Increasing use of laptops to strengthen communication and collaboration
4. Efficiencies gained in lesson planning, preparation, administration and reporting.

1. Improved teacher confidence and expertise with ICT

Overall, there was a shift towards greater confidence over the three-year period. An increasing proportion of expert users felt more comfortable creating a database, downloading digital photos, and using presentation software. Intermediate users felt more comfortable sending emails, using graphics, downloading digital photos, using presentation software, locating online information in a database, and creating a database. Beginners had gained confidence in searching the Internet and locating online information in a database.

2. Growing use of laptop for classroom practice and student learning activities

Between two-thirds and three-quarters of teachers were using their laptops with their students by 2008 (up from 50% in 2006). This use was with individuals (63%), small groups (67%) and more often with the whole class (78%), and most of this use was 'occasional'.

Laptop access to the Internet during lessons had grown over the three-year period from a half to two-thirds of teachers (2006–48%: 2007–62%: 2008–67%). The use of the laptop to individualise learning and to engage children in interactives had grown from a third to nearly two thirds of teachers reporting this use (2006–35%: 2007–54%: 2008–60%). There had also been an increase in laptop use with a data projector from 31% to 54% of teachers.

There was evidence to suggest that teachers were using their laptops to allow students to encounter learning in a variety of ways and through different tasks and contexts. Examples of laptop use within curriculum areas were given by 72% of teachers responding to the questionnaire in 2008. The laptop was used to connect to the Internet to extend the learning beyond the classroom and to allow students to make connections with other students around the world. Used with software, the laptop became a way to provide students multiple ways of learning and helped them to take charge of their own learning. Teachers made resources using the laptop and adapted them to be relevant to their students. The laptop enabled teachers to manipulate visual images from a variety of sources to motivate and inspire children who were learning to read and write. Teachers were finding themselves more often in the role of facilitator of learning, encouraging children to think creatively and to make connections between their learning. Teachers modelled tasks for students using the laptop, helping to make the learning process transparent. The laptop was found to be useful to enhance learning that had first been encountered outside the classroom. There were examples of teaching using the laptop that created a supportive learning environment for the students to undertake inquiry and to be active members of the learning community in their classrooms.

There was a growing demand for professional learning opportunities to help teachers to make use of the laptop for teaching and learning – in 2008, 57% of teachers reported this as the area of development they would prefer (2006–43%: 2007–52%).

3. Increasing use of laptops to strengthen communication and collaboration

There was a growing proportion of teachers who made some use of their laptops to communicate with colleagues within the school (2006-70%: 2007-76%: 2008-82%), and to contact students via email (2006–9%: 2007–13%: 2008–17%). The use of the laptop to email colleagues outside the school (up to 77% from 57%), and to communicate with parents via email (up to 49% from 32%), had increased over the three-year period. There was also increased use of laptops for each of the three collaborative tasks – participating in online discussions, accessing the Internet for professional readings, and the collaborative development of materials. This had the effect of an increased proportion of teachers making some use of the laptop for collaboration, particularly for the participation in online discussion lists or forums (2006-19%: 2007-28%: 2008-31%).

4. Effectiveness in lesson planning and preparation, and administration

By 2008, over three-quarters of teachers were routinely using laptops with planning templates, and to prepare student handouts. Around two-thirds were routinely adapting worksheets for students and accessing Internet information for lessons. The biggest increases in routine use were checking schemes and units (from 44% in 2006, to 55% in 2008) and combining use with other equipment (from 28% in 2006 to 38% in 2008). By 2008, nearly all teachers used their laptops for administrative tasks to do with student data management and reporting, and around three-quarters of teachers used their laptops to check notices and take notes at meetings.

Implications from the findings

The evaluation indicated that school and teacher use of TELA laptops is shaped by the intersection of school and individual teacher vision for, and expertise in, the use of ICT, school technological infrastructure, school leadership and systems for ICT use, and teacher opportunities for learning. Each of these aspects is important in different ways for different schools, however, evidence of the collaborative nature of teaching in the junior school was particularly striking and leads to our recommendation that a collaborative approach to teacher development within schools and in local school communities, supported by the allocation of resources at a policy level, is required to encourage and sustain the integration of the laptops into teachers' work.

Recommendations for policy support of change and sustainability

Support for teacher development and the use of laptops for teaching and learning

- Schools would benefit from continued support in the form of upgraded laptops, reasonable prices for peripherals and ICT technical support, advice and guidance to assist teachers and schools to continue and extend their use of the laptop as an administrative, collaborative and teaching tool.
- Continue support for schools to be involved in cluster groups to share ideas and expertise.
- Research be undertaken into the use of laptop-plus-interactive whiteboard, the Internet and other peripherals at the junior levels.
- Research be undertaken into the nature of peer mentoring at the junior level.
- Research be undertaken into the impact of effective leadership on laptop use.

School leadership

- School leaders be given opportunities to learn about possibilities for ICT use across school management and administration, and for teaching and learning, so they can set expectations for teacher laptop use.

Support for school technological infrastructure development

- School technological infrastructure improvement programmes be seen as ongoing, as teachers are keen to take advantage of new technologies as they are developed.
- Consideration be given to funding onsite school technical support positions.

Alignment with other policy initiatives

- Other policy initiatives include consideration of the role of teacher laptop/ICT use as a means of professional development and for efficiencies.
- Research be undertaken into the combined impacts of different policies on laptop use.

Recommendations for schools

Professional learning opportunities

- Take advantage of opportunities to be involved in cluster groups to share ideas and expertise.
- The introduction of strategies to allow additional ‘time’ to experiment with laptop capabilities and practice with use for teaching would be most beneficial to teachers.
- The focus for future professional development be on how teachers might use the laptop for teaching and learning.
- Consideration be given to how to optimise peer mentoring opportunities to provide for professional learning that is relevant, timely and supportive.

School leadership

- School leaders be encouraged to set expectations for laptop use and provide time and support for teachers to be able to meet these expectations.
- Where practical and appropriate, school leaders model use of laptop/ICT for administrative and management tasks, and for communication.

Support for school technological infrastructure development

- Schools need to budget for ongoing ICT development, maintenance and purchasing of peripherals.

- Schools be encouraged to provide off-site access to school networks to enable teachers to carry out administration, preparation and planning tasks using their laptops at home.

Recommendations for teachers

Professional development: developing and supporting a community of learners

- Teachers take advantage of what opportunities they have to access professional development on the potential of ICT at local, cluster and national forums.
- Peers are the most accessible source of professional development. Teachers would be advised to seek out help from, and share ideas with, colleagues, particularly those in the same syndicate.

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1. Introduction

1.1 Years 1 to 3 context

For Years 1 to 3 of their primary education, most New Zealand children are educated in a full primary school where there are Year 1 to 8 classes or in a contributing school where there are Year 1 to 6 classes. Others attend Years 1 to 13 schools. Data were accessed from Years 1 to 3 teachers from full primary and contributing primary schools for the evaluation of the impact of the TELA scheme. In this report the findings are not differentiated by school type. It should be noted that, on the whole, Years 1 to 3 teachers in primary schools received their laptops a year after any Years 4 to 6 teachers and two years after any Years 7 and 8 teachers in the same school, so it could be expected that support mechanisms would be in place for laptop teachers at the beginning of this evaluation.

1.2 Laptops for teachers in New Zealand

The Digital Horizons: Laptops for teachers scheme (TELA)[1] (Ministry of Education, 2003), was one component of the New Zealand compulsory school sector ICT strategy: Digital Horizons: Learning through ICT [2] (Ministry of Education, 2002). In 2006, *Digital Horizons* was superseded by the *e-Learning Action Plan for Schools* (Ministry of Education, 2006), which outlines the key outcomes and actions for e-Learning in the New Zealand school sector for 2006-2010.

From 2003, the TELA scheme has provided permanent full-time and part-time (0.8 and above) teachers in schools that opted into the scheme access to a laptop for minimal or no cost. The stated goals of the TELA scheme are 'to develop teacher confidence and competence in the use of ICT for professional growth and collaboration, for teaching and learning, and for administration' (Ministry of Education, 2004, p. 4). Schools gained access to laptops for their teachers on the condition that they managed the integration of the laptops into the school environment, including providing and meeting the costs of additional ICT infrastructure, professional development and technical support. The Ministry information package for the scheme stated that school commitment to these requirements was essential for an application to succeed (Ministry of Education, 2003).

The TELA scheme reflects the Government's commitment to increasing the use of ICT in schools to help improve student achievement and teaching practice (Ministry of Education, 2003). It was set up in recognition of the value of the laptop as a teaching tool. Initial advice sent to schools with Years 9 to 13 teachers in September 2002 was followed by implementation commencing in November 2002. The scheme was extended to Years 7 and 8 teachers in 2004, to Year 4 to 6 teachers in 2005 and to Years 1 to 3 teachers in 2006.

1.3 ICT and effective pedagogies

The e-Learning Action Plan for Schools (Ministry of Education, 2006) provides goals and a direction for learning and teaching that is supported by the use of ICT. It recognises that effective teaching that will contribute to student achievement depends upon teachers becoming confident and capable users of ICT and understanding how to integrate ICT effectively into their teaching practice. For example, teachers may delegate more responsibility to the students to self-regulate their learning, and there are opportunities for students to collaborate effectively through peer learning and mentoring. Recent research into effective teaching in the New Zealand context has set out indicators of quality teaching (Alton-Lee, 2003) and The New Zealand Curriculum (Ministry of Education, 2007) suggests that learning supported by or facilitated by ICT has considerable potential to support effective pedagogies. There is a recommendation that

1 www.minedu.govt.nz/goto/tela

2 *Digital Horizons: Learning through ICT* is the foundation policy document for ICT in the New Zealand compulsory education sector. It outlines the Government's goals in relation to ICT as an area of knowledge relevant to all students.

teachers explore the potential of ICT to transform teaching and learning. There is an expectation that there will be a shift in the teaching role through the deliberate and considered use of ICT.

1.4 Laptops for teachers (TELA) evaluation

The purpose of the evaluation summarised in this report was to investigate the impacts of TELA on Years 1 to 3 teachers' work over a period of three years beginning in 2006, the first year that laptops were made available to these teachers through the TELA scheme (see evaluation timeframe in Appendix A). The TELA specifications indicated that it was anticipated that access to a laptop for their individual professional use would lead to gains in teacher confidence and expertise in the use of ICT. It was also expected to enhance teacher professional growth and collaboration; lesson planning and preparation; administration; access to, and the quality production of teaching, learning and assessment resources. The TELA information package (Ministry of Education, 2004) also indicated that it was expected teachers would use the laptops in the classroom for teaching and learning. These anticipated uses were a main focus for the evaluation. The evaluation also sought to identify and understand the factors that enabled and hindered these uses.

1.5 Structure of this report

This final report is a summary and synthesis of the three years of data collection (2006-2008) carried out with Years 1 to 3 teachers who were participants in the TELA scheme. The report begins by providing background information regarding the TELA scheme and how the international setting and trends for the use of laptops/ICT in education provides a background for this evaluation. The evaluation methodology is explained in section three. In section four the impacts of teachers' access to a TELA laptop on their professional work are examined. Incentives for teacher laptop use are described in section five. Sustaining changes in teacher laptop use is examined in section six and recommendations at national, school and personal levels are made in section seven.

2. Trends: ICT in education/laptops for teachers

2.1 Young children learning with ICT

It is now generally accepted that young students can benefit from using ICT in their learning (Ministry of Education (2005). The use of ICT by young students in the early primary school years has its own unique potential and challenges for supporting learning (Goodison, 2002; Clements, 2002; Kilderry, Yelland, Lazaridis, & Dragicevic, 2003; Bolstad, 2004; Dwyer, 2007). ICT allows young children to communicate and represent ideas in ways that are less reliant on physical coordination, reducing the need for writing (Goodison, 2002). Dwyer (2007) proposes that the nature of ICT is that ideas are linked together in terms of associations – a reflection of the natural thought pattern, rather than linear ideas as is the case of print-based resources. Working with ICT allows a more natural approach to thinking and working with information and knowledge for a young child (Sheirdan & Pramling Samuelsson, 2003). Kilderry et al. (2003) propose that ICT allows young children to experience, work with and build on ideas that were previously inaccessible owing to their abstract and complex nature. Clements (2002) argues that ICT enables young students greater opportunities for working with ideas creatively and to engage in higher-order thinking. Erstad (2005) discusses how technology can make the learning space larger – students can reach out of the classroom, inquire and extend their knowledge of the outside world – an important focus of junior classrooms being to support children to become aware of their own lives in relation to others in the community and the world.

Students in the early years of school are often comfortable enough with their own computer skills to be able to focus on learning the content they are working with rather than the technology (Kilderry, et al., 2003). Children's experiences in early childhood settings, coupled with increased home access and use of ICT, mean that many young students are entering schools with developed ICT skills (Rideout, Vandewater, & Wartella, 2003). A case study by O'Hara (2008) that involved observations of, and interviews with, children between 4 and 5 years of age, as well as interviews with teachers, supports claims that ICT has the potential to extend and enhance provision for younger pupils by providing new and complementary opportunities for children to be creative; to hone generic learning skills and aptitudes; and to practise their social skills. O'Hara also suggests that not all young children are enthused by the introduction of ICT and that in some cases pedagogy still has to catch up with resourcing to get the most out of the technology. There were a number of outcomes reported by Ramsey, Breen, Sturm, Lee and Carr (2006) who asked questions about the integration of ICT into everyday learning and teaching in a kindergarten sited in a multicultural and multilingual community in New Zealand. They found that:

> *ICT added another (predominantly visual) mode of communication and representation for children who had not yet learned to read and write. It enabled them to 'read' and revisit their learning, strengthening their identities as confident and competent learners. It also enabled them to develop their story-telling abilities and dispositions by telling visual stories (often about their own or about other children's learning) with spoken or dictated commentary. Children added ICT to their communication repertoire and it enhanced their dispositions to use other modes: to speak, write and draw. ICT provided a 'way in' to communicate in a range of modes, in a new place, and a motivation to participate. ICT added excitement and interest to the learning in many areas and topics. It also added ways in which children could take responsibility in the learning and teaching process, and children took up these opportunities with enthusiasm.*

The use of computers in the classroom not only impacts on learning but also on social processes and relations (Clements, 2002; Bolstad, 2004; Dwyer, 2007). Wang and Carter Ching (2003) investigated group computer use by

first-grade children within their classroom culture. They found that students were constantly negotiating between their individual and collective goals in the classroom and the affordances of the environment, as they created their own definition of computer use, while simultaneously conforming to the rules set by the teacher.

These ideas have been taken into consideration in this evaluation report.

2.2 Teacher use of laptops

In the last ten years, educational authorities in Australia, Britain and New Zealand, to name but a few, have moved to provide laptops to teachers (Cunningham, Kerr, McEune, Smith & Harris, 2003; Finger & Trinidad, 2002; Ministry of Education, 2002).

Research indicates that teachers are taking advantage of the flexibility laptops provide in terms of time and space (Cunningham, Kerr, McEune, Smith & Harris, 2003; Windschilt & Sahl, 2002). Sockwell and Zhang (2003) noted that teachers, who had formerly shared desktop computers with other teachers or students, reported a sense of ownership of their laptop. They acknowledged the advantages of 'having everything in one place' and liked the continual everyday availability of laptops. The portability and wireless capability of laptops gave teachers more options than desktop computers and allowed them to perform a variety of activities with increased efficiency and productivity (Sockwell & Zhang, 2003).

It is not necessarily the case, however, that because teachers develop some expertise and gain confidence in using their portable laptop computer that there will be flow-on effects for teaching and learning. The research literature provides very little support for this supposition (Becker, 1999; Cuban, 2001). More often than not, teachers make more use of computers and ICT technology, out of the classroom, for non-instructional purposes but in support of their teaching (Bebell, Russell & O'Dwyer, 2004). Rather than the technology transforming teaching and learning, teachers use computers to maintain their existing classroom practices (Cuban, 2001). Selwyn (2002) argues that this is because computers have been 'inserted' into schools with very little consideration of teacher perspectives and the realities of classrooms (see also Olson, 2000).

Cunningham et al. (2004), reporting on teacher perceptions at the end of the first year of their having access to a laptop for their individual professional use, note that teachers had become more confident and competent in their ICT use since receiving their laptops. Teachers reported greater access to a range of resources and an increase in the professional quality of lesson materials. The laptop was said to provide for the streamlining of management and administrative tasks. Teachers appreciated the flexibility in time and place of work provided by the laptop. There is some evidence that laptops supported increased communication between teachers, students and parents and greater sharing of information between teachers (Rudd, 2001). Teachers felt they were gaining maximum impact from their laptops when they used them in conjunction with peripherals.

Evidence is also emerging that teachers find a laptop affords greater access to resources for lesson preparation and provides for the streamlining of management and administrative tasks. Teachers have reported increases in ICT confidence and competence with perceived positive impacts in the classroom.

From these studies a picture has begun to emerge that, just as with teacher use of computers, a multiplicity of personal and contextual factors interact to frame and shape teacher integration of laptops into their professional lives (Donovan, Hartley & Strudler, 2007; Jones, 2004; Scrimshaw, 2004; Zhao & Frank, 2003; Zhao, Pugh, Sheldon & Byers, 2002; Fink-Jensen, Johnson & Lau, 2003; Savidan, 2003). Assess to ICT on its own does not necessarily result in changes for teachers or schools. To bring about changes a number of factors must be considered that are related to school-wide opportunities and incentives for ICT use, department factors and classroom factors.

Some researchers argue that teachers who are confident and competent in using ICT not only appreciate its usefulness but can also envisage possible benefits for their students (Jones, 2004; Zhao & Frank, 2003) whilst others caution teacher response to innovation is never sequential, predictable or even able to be generalised (Windschilt & Sahl, 2002). This said, there is general agreement that teacher integration of ICT into teaching and learning takes time and involves more than the provision of resources and the development of technical skills. Professional development to enhance the use of ICT needs to cater for varying levels of knowledge and expertise and to balance teacher skill and pedagogical needs (Donovan, Hartley & Strudler, 2007; Zhao, Pugh, Sheldon & Byers, 2002). In terms of contextual factors, school leadership including a vision for change and planning for action to implement this vision are crucial (Cuban, Kilpatrick & Peck, 2001). Windschilt and Sahl (2002) and Zhao and colleagues (Zhao & Frank, 2003; Zhao et al., 2002) provide evidence that when the prevailing school culture is one of collaboration and mutual support for change, the diffusion of technology innovations is more likely. Teacher use of ICT, particularly any integrated classroom use, requires a reliable technological infrastructure that includes network systems, hardware and software (Cox, Preston & Cox, 1999). Quality on-site technical support is also important so that teachers can be confident that ICT equipment will be functional when they need it (Becker, 1998; Jones, 2004).

As this brief overview of research implies, while teacher use of a laptop is shaped by their own knowledge, skills and enthusiasm for exploring potential uses it also depends on contextual issues outside individual teacher immediate control.

3. Laptops for teachers (TELA) evaluation

3.1 Evaluation focus

The focus of this evaluation was to monitor the impacts of the TELA scheme on teachers' professional lives including the impacts on administration and management, lesson planning and preparation and, in particular, the impact on classroom teaching and learning. Consistent with Ministry of Education expectations for the TELA scheme, the evaluation sought to find out "what kind of professional tasks are undertaken using the laptop" and "patterns of use over time and what kind of professional tool the laptop becomes" (Ministry of Education, 2004). The goal was to understand the impacts of TELA so that the scheme might be adjusted to best support the integration of the laptops into school and teacher practices.

3.2 Evaluation framework

Policy support for change and sustainability

Research that has sought to explicate what contributes to the sustainable systemic use of ICTs has highlighted the role of national policy in shaping the context for ICT (see for example Kozma, 2005; Olson, 2000; Selwyn, 2002: Venezky, 2004). Hennessey, Ruthven and Deaney (2005) warn that policy approaches that ignore personal and professional beliefs and that expect teachers to adopt an innovation do not necessarily lead to classroom change. In New Zealand, the TELA initiative affords all New Zealand teachers access to a personal laptop computer. Evaluation findings to date have found that teachers bring their own experiences, abilities and knowledge to laptop ownership. Policy expectations for the use of electronic data in association with professional development were unwritten to a large extent but have become essential activities in many schools. The evaluation has identified contextual factors such as leadership and school technological infrastructure as enabling or constraining teacher laptop use, but there are also the professional learning opportunities that other policy initiatives such as Numeracy, Literacy and the ICT PD cluster programme offer that can support schools as they undertake whole-school change. A recent policy document, the e-Learning Action Plan developed for New Zealand schools (Ministry of Education, 2006), promotes the use of communication and learning networks as a way to provide teachers with relevant and timely information about effective e-Learning teaching practice. e-Learning is now the term used to identify any learning that is facilitated by, or supported through, the smart use of information and communication technologies. This places learners and teachers at the centre of their own communication and information networks and is the key idea in a new action plan for schools that aspires to transform the way we learn (Ministry of Education, 2006). This evaluation describes examples of teacher laptop use that match e-Learning objectives for effective teaching, and considers other policy initiatives that have helped to make effective use of teachers' TELA laptops.

The school context for change

Although teachers may work closely with one another in school groups or 'learning communities' (Lave & Wenger, 1991) where one might expect innovations involving ICT to be readily shared, in reality practice develops over time, and sharing information with colleagues is not enough to embed a new practice (Loveless, DeVoogd & Bohlin, 2001; Hennessey & Deaney, 2004). Research indicates that integrating ICT is a gradual, reflective process for most teachers and one that is influenced by a complex mix of factors. In particular, effective practice involves developing new forms of pedagogy (Loveless et al, 2001; Hennessey & Deaney, 2004). Loveless et al. discuss the differing perspectives of 'old' and 'new' pedagogies, but comment that with three or fewer computers in a classroom and with close to 30 students the pedagogical strategies are limited and that instructional methods will more than likely be substitutes for the chalkboard, or in the case of the student working at a computer screen would leave learning management up to the software program, so that the learner never has to manage his or her own learning. Many of the 'new' ways of knowing require teachers to establish new classroom routines and procedures that reflect evolving theories about knowledge, and

have not diffused into the majority of classrooms because the pressures of such a change are too great – the new teacher, concerned with classroom management, is not likely to be adventurous enough, the established teacher is already comfortable teaching in a particular way, or there is no school priority given to ICT-supported learning. Hennessey and Deaney (2004) found that a supportive organisational culture can lead to further resources and expanding practice, which in turn leads to teachers' increasing confidence, skills and motivation towards using ICT. Organisational factors or whole-school characteristics were found to have the biggest motivating influence on both sustainability/development and dissemination of ICT-supported practice, with access to technology being the most frequently mentioned factor in this group. Organisational change and prioritisation of ICT by the school had a significant impact on both development and dissemination. This evaluation looked at the contextual factors that support or constrain teacher use of laptops and described any change over the three-year period.

Teacher confidence, and pedagogic beliefs

In a study of British secondary schools where teachers used ICT in their teaching by Hennessey and Deaney (2004) there was a gradual but perceptible process of pedagogical evolution taking place. Their research found that teachers' technical confidence and confidence in approach played a key role in change to ICT-supported learning, as did affinity, technology skills, resistance to change and teacher age. Hennessey and Deaney propose that while school and curriculum requirements may have some influence in teachers taking up ICT-supported practices, once practices are established and trialled, teacher confidence and enthusiasm for using ICT and their pedagogic beliefs may become more significant motivational factors underlying their sustainability over time and generalisability to further contexts (p. 6). This is reflected in Shulman and Shulman's (2004) model for teacher learning that has individual reflection at the centre, supported by individual, community and policy factors. These studies make it apparent that any evaluation of teachers' use of laptops must bear in mind the policies that support such use and the context in which teachers work. However, of prime importance for sustainability of ICT-supported teaching is the individual teacher's voice that must be heard. This evaluation therefore sought to identify and portray both how teachers were using their laptops and the set of inter-related factors that affected the integration of the laptops into teachers' professional lives, with the overall goal of developing an understanding of how and why Years 1 to 3 teachers came to use their laptops in different ways over time. The emphasis of the evaluation was on the immediate impacts of the TELA scheme on teachers' professional practices and the factors that enabled and constrained these practices. Although this generated incidental data about changes in the school context and wider policy initiatives, these were not the direct focus of the study.

3.3 Evaluation methodology

The TELA evaluation design was to use three-yearly cycles of annual nationwide surveys via a written questionnaire, and regional focus groups. The different methods and how they relate to the evaluation focus is now given:

3.3.1 Questionnaires

Surveys are useful for generating prevalence data on first-hand experiences (Cohen, Manion & Morrison, 2000). In this evaluation the survey questionnaires were designed to provide prevalence data on different types of teacher use of the laptops and the kinds of support they had experienced for these uses. The Years 1 to 3 questionnaire built on some years of experience with other teachers (Years 4 to 13 teachers who had TELA laptops). Many of the same questions were used across the year groupings and across the three years of the study so that comparisons of frequency of use and patterns of use over time could be made. The impacts of the TELA scheme on teachers' professional lives were monitored by the inclusion of questions on laptop use for teacher professional growth and collaboration, lesson planning and preparation, administration, access to, and quality production of teaching, learning and assessment resources, and classroom practice. Questions also prompted teachers to report on their self-assessment of the expertise and comfort with a range of tasks. Free response questions were included where categories had not been defined, so that teachers could describe more fully their experiences, such as what they had found useful about any laptop-based professional development and describing an example of laptop use in the classroom.

Questionnaire data were analysed using the statistical package SPSS. Frequencies and ratios were calculated; percentages were rounded up to the next whole number. Qualitative data from free-response questions were coded into categories. Frequencies and ratios were calculated, but reporting these data was designed to highlight particular trends and weightings given in teachers' responses. The combination of quantitative and qualitative survey data provided for a deeper understanding of the ways teachers were making use of the TELA laptops, and the factors that contributed to these uses.

3.3.2 Focus groups

Focus groups can also be used as a method in their own right but they are also a useful complement to other data collection methods (Cohen, Manion & Morrison, 2000). In this study, the focus group discussions enabled researchers to understand more fully the impacts on teachers' professional lives and to explore the factors that influenced these impacts, albeit for a very small group of teachers. The focus groups served as a check that the questionnaire addressed key concerns and practices as these evolved for Years 1 to 3 teachers over the three-year period of the study. The focus group discussions allowed the researchers to validate their interpretations of the qualitative questionnaire comments. They also allowed for the fuller exploration of some of the issues associated with teacher use of laptops. Topics for the focus group discussions included what kind of professional tasks were being undertaken using the laptop and how these uses had changed from one year to the next. Teachers were also asked to comment on factors that enabled and constrained their laptop use and their goals for the next year. Focus group discussions were taped and transcribed. In this report the focus group data have been included to illustrate points made in teacher written responses.

3.4 Participants

3.4.1 Questionnaire respondents

The procedure to recruit Years 1 to 3 teachers for the questionnaire began with creating a random sample from a list provided by the Ministry, as at August 2004, of schools involved in the laptop scheme. From a pool of 1,195 schools, a random sample of 120 schools was generated. The 76 Years 1 to 8 schools that had taken part in the Years 7 and 8 evaluation were added to bring the sample of schools to 196. The sample was stratified, in case of non-response, leading to a sample of 204 schools. In 2006 a further 126 schools were added, making the sample 330, so as to ensure wider coverage of schools and teachers.

The researchers contacted the principals of the schools in the sample, notifying them about the Ministry of Education Laptops for Teachers evaluation and inviting their school to take part in the evaluation. Principals were advised that questionnaires would be sent out in the second term of 2006, and then again in 2007 and 2008. The principal was asked to nominate one teacher who would accept responsibility for distributing, collecting and returning the completed paper questionnaires to the research team, and for forwarding the website address to teachers who chose to complete the questionnaire online.

Respondent teachers represented schools in all deciles, mostly in main urban areas, and all schools were co-educational. One hundred and two schools returned completed questionnaires in 2006 (54 contributing, 45 full primary, 2 composite/restricted composite, and 1 special school), 119 in 2007 (61 contributing, 56 full primary, 1 composite and 1 special school) and 100 in 2008 (49 contributing, 48 full primary, 1 composite/restricted composite, and 2 special schools).

The number of respondents was 271 in 2006, 340 in 2007 and 317 in 2008. Around 30% of Year 1-3 teachers in each year of the evaluation were under the age of 35 years; 23% between the ages of 35 and 44 years; and 47% were over the age of 45. Nearly all Years 1 to 3 teachers were female (2006-96%: 2007-96%: 2008-95%) and nearly all respondents had a teaching role in their school. Nearly three-quarters were classroom teachers (2006-69%: 2007-74%: 2008-73%). Around a sixth (2006-15%: 2007-12%: 2008-14%) were heads of department, syndicate leaders or senior teachers. Each

year around a fifth (2006-18%: 2007-19%: 2008-20%) of questionnaire respondents had responsibility for ICT in their schools. Across the three years around a quarter had between 0-5 years teaching experience (2006-25%: 2007-26%: 2008-25%). Around a third had between 6 and 15 years experience (2006-33%: 2007-31%: 2008-33%). Just over two-fifths in each year of the evaluation had spent more than 15 years teaching (2006-42%: 2007-43%: 2007-42%).

It is important to note that it is impossible to know if the respondent teachers in this evaluation are representative of the Years 1 to 3 teaching population that have accessed TELA laptops. Because of this, and because of the self-report nature of the evaluation data, caution is needed interpreting the findings. The data reflect what teachers considered relevant in relation to the questions about their laptop use and what supported, and constrained, this use. No classroom observations were conducted and so the examples of classroom for teaching and learning are also teacher self-report. This said, teacher perceptions and beliefs are important because they have been linked to teacher use of ICTs.

3.4.2 Focus group respondents

There were three focus group meetings held in regional areas each year – Hutt Valley, Marlborough and Taranaki. Focus group schools were selected on their geographical location, with due regard to achieving a spread of school socio-economic status and size. Consideration was also given to a mix of state and integrated schools. In 2006, when the Years 1 to 3 evaluation began, all the schools were selected by a Ministry of Education representative were or had been involved in the ICTPD School Clusters Programme[3]. Having selected the schools, the researchers contacted the schools initially by phone followed by letter. Schools that declined to be part of the study were replaced by similar schools in relation to the variables identified above. Every effort was made to encourage teachers to attend a focus group by pointing out the benefits of participation.

Each year between 14 and 20 Years 1 to 3 teachers from between 20 and 26 schools took part in focus group discussions. Focus group discussions were held in non-school venues and lasted for up to three hours. Those attending commented on the positive experience of attending a focus group and on the professional development that it had given as a space to share ideas and examples of practice using ICT. Discussion was lively and positive.

3.5 Evaluation timetable, evaluation reports and dissemination

The evaluation timetable (Appendix A) shows that findings were presented in reports at six-monthly intervals, informing the ongoing thinking (about the TELA scheme) of the policy and programme manager stakeholders. There have been numerous formal and informal discussions with the TELA project manager about the findings and their implications for TELA policy. One research paper has been given at a national educational conference (Harlow, Cowie & Jones, 2006) and one at an international conference (Cowie, Harlow, Jones & Cooper, 2008). One article focusing on laptop/ICT use by Years 1 to 3 teachers[4] has been published in a New Zealand educational journal – *Computers in New Zealand Schools.* This final report of the Years 1 to 3 findings should be viewed as one element in a total utilisation process.

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[3] Since 1999, The Ministry of Education has funded ICT professional development in schools through an ICT PD School Clusters Programme. By March 2004, approximately half of New Zealand schools were or had been involved in this programme (Ham, 2005).

[4] Harlow, A., & Cowie, B. (2008). *Will the teacher's laptop transform learning?* Computers in New Zealand Schools. (20)3.

4. Impacts on teacher professional practice

In this section, we set out key findings over the three years in relation to the impacts of teacher access to a TELA laptop on individuals and schools.

4.1 Changes in perceptions of expertise and comfort levels

One of the immediate impacts of laptop access was expected to be that teachers would experience gains in ICT confidence, appropriate skills and knowledge. They were expected to broaden and increase their use of electronic resources. Teachers were asked to rate their own ability to use their laptop and were given three categories from which to choose – expert users, intermediate users and beginners. There was an increased confidence in using the laptop over the three-year period as shown in Table 1.

Table 1: Perceived ability to use a laptop (2006-2008)

Perceived ability	2006 % (n=271)	2007 % (n=340)	2008 % (n=317)
Expert users	15	16	24
Intermediate users	66	70	68
Beginners	18	14	9

Table 1 shows a rise in those teachers considering themselves to be 'expert users' over the three-year period, with very few 'beginners' by 2008. Over 90 percent (92%) of the Years 1 to 3 teachers who participated in this study rated their level of expertise as expert or intermediate suggesting a high level of overall confidence within this group as to their ability to use ICT.

Table 2: Age and perceived ability (2006-2008)

Age	Expert (%)			Intermediate (%)			Beginner (%)		
	2006 (n=42)	2007 (n=55)	2008 (n=76)	2006 (n=179)	2007 (n=236)	2008 (n=214)	2006 (n=50)	2007 (n=48)	2008 (n=27)
<25	7	15	33	79	75	67	14	10	0
25-34	20	21	34	72	71	62	8	8	4
35-44	19	13	22	66	74	72	15	13	6
45-54	11	17	22	62	65	68	27	18	10
>55	13	12	13	62	68	68	25	20	18
Total	15	16	24	66	70	68	18	14	9

Table 2 shows that younger teachers were more likely to rate themselves as having expertise than older teachers, and that there were a higher proportion of younger teachers each year who rated themselves as expert users. By 2008, there were a higher proportion of expert users under the age of 35; a higher proportion of intermediate users aged between 35 and 44 years; and a higher proportion of beginners aged 45 years and over. There was some interesting feedback from younger teachers in schools: in the Years 1 to 3 focus group meetings there were teachers in their first and second year of teaching who had had no pre-laptop teaching experience. This means that as teachers they may never have had to, for example, write reports by hand. Another factor that affected laptop use was that the younger teachers, in particular, were mobile phone users and did not necessarily have a landline in their homes or flats, so Internet or school network access from the laptop at home was not possible. There was some indication, particularly from focus group teachers in rural areas, that there was a lot of responsibility placed on young teachers who had always used ICT and who had

expertise in either the use of laptops or who offered technical expertise, with very little, if any, resourcing available to them.

> *I run the school computer club from year fours up. Last year I had ten Year fours doing PowerPoints. This term so far I've had ten Year five and sixes doing iPhoto – three of them have just become finalists in a competition. With my Year fours I am working on creating the school website and the Year five and sixes are now moving on to PowerPoints, Claymations are planned for next term. This is done during lunchtime. I have created the Powerpoints for the songs for assembly and my laptop is the one that the seniors come and get for assembly singing. (2008 focus group comment – 2nd year teacher)*

The same young teacher would have appreciated some support:

> *It would be good to have time – I spent three hours last weekend loading all the new games onto the new laptops we have just bought. I do all the technical support as well as all the other problems – they come to me. The other day I was taking a reading group and someone came in and said, "How do I get this to print?!" So I said I would do it after the group and it interrupted my whole day, which is a tad annoying! Time off or to be able to have the whole staff off for a couple of days and sit down and say "I know this – does anyone need help with this?" (2008 focus group comment – 2nd year teacher)*

Each year, teachers were asked what tasks they felt comfortable using their laptops for. Table 3 shows how comfort levels for teachers in each group of self-reported level of expertise changed over the three-year period for the listed tasks. Overall, teachers were more likely to be comfortable using their laptops over the three-year period. The proportion of those who rated themselves as intermediate users and beginners had become more comfortable using their laptops for two of the three tasks over the three-year period.

Nearly all expert users felt comfortable at the end of three years with using the laptop as a word processor, to send emails, search the Internet and to use graphics. They remained more likely to be comfortable with all listed tasks than other groups. Bearing in mind the rise in the proportion of expert users over the period, there were six tasks where the proportion of expert users feeling comfortable dropped. Intermediate users became markedly more comfortable using their laptops for using graphics, downloading digital photos and presentation software, over the three-year period. Although there were very few beginners, they too appeared to be starting at a higher skill level than they had in 2006 with regard to searching the Internet and locating information in a database.

Table 3: Percentages of teachers who felt 'comfortable' using laptops for listed tasks (2006-2008)

Task	Expert (%)			Intermediate (%)			Beginner (%)		
	2006 (n=42)	2007 (n=55)	2008- (n=76)	2006 (n=179)	2007 (n=237)	2008 (n=214)	2006 (n=50)	2007 (n=48)	2008 (n=27)
Use as a word processor	98	100	100	97	98	96	72	81	67
Send emails	100	98	99	86	90	94	58	73	59
Search the Internet	95	96	99	81	81	83	43	50	56
Use graphics	100	98	97	56	71	75	20	27	15
Download digital photos	80	91	87	39	49	50	8	17	7
Use presentation software	80	93	87	26	41	42	6	13	0
Locate online info in database	83	82	71	39	39	44	10	17	19
Use a spreadsheet	61	64	57	18	17	20	0	0	0
Use movie-editing software	30	31	28	7	6	5	0	0	0
Create a database	12	27	36	6	6	10	0	2	0
Create visual data for web page	-	-	12	-	-	3	-	-	0
Create web pages	15	18	8	1	2	1	0	0	0

It is interesting to note that although there appears to be a trend towards teachers becoming more comfortable over time with the listed tasks, expert users remained considerably more likely to be comfortable than intermediate users or beginners. There were a low proportion of beginners but they still tended to be more likely to be comfortable using their laptops for word processing, emailing and searching the Internet than for other tasks. As can be seen in Table 3, expert users were twice as likely to be 'comfortable' as intermediate users using the laptop with presentation software (expert users 87%: intermediate users 42%), and using a spreadsheet (expert users 57%: intermediate users 20%).

Discussion

Teacher-reported gains in ICT confidence, skills and knowledge indicate the TELA scheme has been successful in expanding the number of teachers who are comfortable with using computers, in this case a laptop computer, for a range of tasks.

4.2 Changes in classroom practice

One of the Ministry of Education's expected outcomes of the laptop scheme was that teachers would creatively introduce a range of learning resources in the classroom using a variety of appropriate technologies and pedagogies. e-Learning and pedagogy have been emphasised (Ministry of Education, 2006) and are included as a key component of the revised New Zealand Curriculum (Ministry of Education, 2007) where the suggestion is that e-Learning may enhance opportunities to learn, assist the making of connections, facilitate shared learning and assist in the creation of supportive learning environments. Schools are expected to explore not only how ICT can supplement traditional ways of teaching but also how it can open up new and different ways of learning.

Over the three-year period, laptop access to the Internet in the classroom had increased from 83% to 96% of Years 1 to 3 teachers which may have contributed to an increased use of the laptop to access the Internet during lessons (2006–48%: 2007–62%: 2008–67%). This increased use of the Internet during class time could also be owing to an Inquiry

Learning[5] focus, as this emphasis was mentioned particularly by focus groups. There was also an increase in laptop use with peripherals – the proportion of teachers using a data projector had risen from 31% in 2006 to 54% in 2008 (easy access to a data projector had increased from 55% up to 77% during the same time) and the number of teachers who used an interactive whiteboard had risen from 8 to 47. Across all ability groups, occasional use for all uses was usual.

Between two-thirds and three-quarters of teachers reported using their laptops with their students by 2008 (up from half of teachers in 2006). This use was with individuals (63%), small groups (67%) and more often with the whole class (78%), and most of this use was 'occasional'. The introduction of a range of learning resources in the classroom was illustrated by teachers' descriptions of how they were using their laptops in the classroom for teaching and learning. Each year there were increasing numbers of examples given in most learning areas (see Table 4). Furthermore, an increasing proportion of teachers reported that the area they most wanted development in was the use of the laptop in teaching and learning (2006–43%: 2007–52%: 2008–57%).

Table 4: Examples of Years 1 to 3 teachers' laptop use in curriculum areas (2006-2008)

Teachers' laptop use in Year 1 to 3 classrooms	2006 (N=271)	2007 (N=340)	2008 (N=317)
Language	52	64	67
Mathematics	13	41	48
Science	23	27	36
Social Studies	11	20	19
The Arts	5	8	10
HPE (health/PE)	3	7	7
Technology	6	2	1
ICT	-	21	8
Integrated	8	23	31
Total count – examples	121	213	227

Teachers' reported laptop use in Years 1 to 3 classrooms covered all areas of the curriculum, and many examples illustrated Alton-Lee's characterisations of effective pedagogy (Alton-Lee, 2003), the Ministry of Education's ideals for effective pedagogy (Ministry of Education, 2007), and also the e-Learning Action Plan (Ministry of Education, 2006). Some of these examples are now detailed under headings derived from the e-Learning Action Plan on teacher capability (Ministry of Education, 2006, p.10) along with the relevant results over the three-year period of the TELA evaluation. The Action Plan calls for effective teachers to use e-Learning to:

- create new learning environments based on a blended learning approach, which allows students to explore and investigate think critically and work creatively, plan and reflect, share their learning with others and use self assessment, and encounter learning in a new way
- customise learning experiences to recognise individual, cultural, and developmental differences
- enhance communication and collaboration to build partnerships beyond the classroom, expanding the community of learners
- increase the modes of teaching and learning.

[5] Inquiry Learning is a process where students formulate investigative questions, carry out research using a series of structured investigations to obtain factual information, build knowledge that answers their original question, then evaluate and report on their findings.

4.2.1 Create new learning environments based on a blended learning approach

e-Learning is defined in the e-Learning Action Plan as being learning and teaching that is facilitated by or supported through the smart use of information and communication technologies (Ministry of Education, 2006, p.2). Effective teachers are expected to use e-Learning to create new learning environments based on a blended learning approach where there is a combination of use of technology and other forms of delivery. A blended learning approach will allow students to:

- explore and investigate
- think critically and work creatively
- plan and reflect
- share work with others and use self-assessment
- encounter learning in a new way (inquiry learning).

Examples of students exploring and investigating:

The teachers used a laptop with a range of other equipment that allowed them to support children to explore and investigate. Students were able to use a digital microscope to examine a honeybee they had discovered in the playground:

> *Looking at honeybees using a digital microscope, the children were able to see the three body parts easily and we also managed to see the difference between wasps and bees and their stingers. (2007 comment - science)*

The laptops connected to the Internet provided students with increased access to information, including information that may not have been in the library or within their teacher's domain. Teachers gave examples of how they worked with children on the laptop with the Internet to expand the learning environment (Erstad, 2005) when children had questions and/or wanted to find out more:

> *Reading group reading about Red Adair – we used the Internet to find out more about him. Also looked at Tiger Woods with another group. We researched five facts we didn't know about each person. (2007 comment – English)*[6]

> *We were reading a book on Sir Edmund Hillary – questions arose. We used the Internet to answer - Where in the world is Mount Everest? What does Nepal look like? Is Tenzing Norgay still alive? etc. Finding the answers was instant. (2008 comment – social studies)*

> *Looking at different types of Maraes (sic) – relating to our current topic. What the Marae we are going to will look like. (2008 comment – languages: Māori)*

Examples of students thinking critically and working creatively

Prior to introducing new learning, teachers used their laptops with flowcharts and software to stimulate the curiosity of their students and to find out what children already knew. In doing so, they made use of ICT to link children's ideas in terms of associations (Dwyer, 2007). Teachers described the use of the laptop-plus-a-data projector to engage the whole class in discussion. The students in this example would have had to think critically about the classification of their ideas:

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[6] Where a quotation is identified by (date, comment): this means that the comment is from the questionnaire. Other quotations are identified as coming from focus group participants.

> *Created a Kidspiration mind map of modes of transport and asked children to classify these into 'past and present', 'uses', 'fuel and no fuel', or 'land, sea, air', etc. (2008 comment – social studies)*

The use of the laptop with a digital camera motivated children to recall an out-of-classroom experience and create a representation of that experience in the classroom:

> *Our class went on a bush walk. We took digital photos and downloaded them onto laptop and showed them later. We used our experience as a motivation to create artworks. We were able to revisit the scene to get true representation of plants found in the forest. (2007 comment – arts)*

This teacher used *Youtube* clips to motivate the students to work creatively:

> *Class viewed Utube (Youtube) clips for inspiration before a series of visual arts lessons. Later their work was photographed and printed off, to be added to their story of the journey they made to the final piece of sculpture. (2008 comment – the arts)*

This example shows how children were stimulated to create music through listening to whale sounds:

> *Researched on the Internet for whale sounds for children to copy with instruments. Children listened to several pieces and were able to choose one to interpret with an instrument. (2007 comment – Arts)*

In all these examples, young children were using ICT to communicate and represent ideas in ways that did not require the fine physical coordination needed for writing (Goodison, 2002).

Examples of students planning and reflecting

Children were looking up information on planned class trip destinations and learning about key aspects before they even left the school:

> *Learning about mammals and we were going to the zoo, so we accessed the zoo site before to learn about the animals we would see. (2008 comment – science)*

Once a class trip had been undertaken, the laptop was found to be useful to enhance new learning that had been first encountered outside the classroom (Alton-Lee, 2003). Teachers used the laptop to show images taken with a digital camera to re-engage children in a topic and to reflect on what the experience was like:

> *Zoo trip photos, used a data projector connected to laptop. Viewed photos taken on the zoo trip. Discussed ideas for a writing lesson – focusing on formulating simple sentences. Children took turns. (2008 comment – integrated)*

This next example of laptop use in technology came after a class trip to remind students of designs before they designed a similar product themselves:

> *Made slide show of zoo enclosures following a zoo trip to aid the children's design of enclosures. (2007 comment – technology)*

These students were prompted to reflect on their prior knowledge to interpret an image:

> *I found an image off stuff.co.nz and projected it on to the screen. The children discussed the image and helped me write about what they thought was happening in it. (2008 comment – English)*

Examples of students sharing their learning with others

In some classrooms, the more flexible learning environment has allowed teachers to become more a facilitator of learning. This is evident in the examples given where teachers report: 'we did…', 'the children helped me', etc. Children were guided to complete activities, to report on, present and evaluate their own work. Teachers were using the laptop to support students to share their work with others.

> *Sharing children's work at published level with others in the class. (2007 comment – English)*

> *Shared photos of activities or experiences we have had together. The children [are motivated to] do their writing in their books then publish it on the laptop. (2007 comment – social studies)*

The use of the laptop with a digital camera made learning more relevant to students by engaging them in creative ways to present what they had learned (Ministry of Education, 2006, p.10), as in the following example:

> *Children retold Maui and the Sun, an illustrated story, with paint, fabric, stones, ferns. Used digital camera to make slide show of story. Children read the captions, which were recorded. Children read back their story and loved to see their artwork. (2008 comment - languages: Māori)*

Examples of students participating in assessment for learning

The use of learning intentions and success criteria are recommended assessment for learning strategies (Black & Wiliam, 1998). Teachers gave examples of how they were using learning intentions saved on the laptop to help the children make connections between lessons and to plan their work:

> *My laptop is hooked up to an interactive whiteboard. In writing each day, we open the Learning Intention and Success Criteria previously saved. Recently the children were learning to plan a narrative story. I shared the Learning Intentions and Success Criteria. (2008 comment – English)*

Teachers were using the laptop to support student self-assessment, thereby assisting students to take responsibility for their own improvement (Alton-Lee, 2003), as these examples show in physical education where student performance was captured on a digital camera then students reviewed their performance.

> *Made a DVD of the class doing gymnastics, watched it with class and discussed our learning intentions and whether they had achieved them or not, discussed changes they would like to make for the next lesson. (2008 comment – HPE)*

> *Photographs of the beginning stages of each child swimming freestyle. Correcting their techniques while viewing this and explaining how they can improve. (2007 comment – HPE)*

This example shows how in science children could learn to review and discuss what went well in a project and to recall the work of others in the class:

> *Showed photos of their volcano making and used it discuss the process they had used and what worked best etc. It also meant they could view other people's work. (2008 comment – science)*

Examples of use for inquiry learning

Brainstorming using Inspiration software, Internet searches, using images and students presenting their work were features of integrated learning units and inquiry learning topics that teachers described using their laptops for. The laptop played a role in inquiry learning – by bookmarking certain websites for the students to use, teachers customised a programme of learning, enabling students easy access to information:

For inquiry learning, pupils need to be able to source info from a variety of Internet sites. I have searched for best ones and bookmarked them so pupils have freedom to begin without getting lost. (2007 comment – integrated)

Our inquiry topic was 'Sound' and the children wanted to know how we can hear. So one of the knowledge net resources has an example of a digital learning object where you went inside the ear. First of all, I showed that to the children using the data projector and then using the pod of laptops that the children can use they could navigate the game go right into the tubes of the ear. It was really visual and there is no way that I could have held up a diagram out of a book. It was like a game, it was fantastic (if you can find digital learning objects like that for juniors – some of them talk, so the instructions of how to navigate are very supportive, it is limiting for Year Ones if there is a lot of writing). (2007 focus group comment)

Access and demonstrate interactive sites showing translation in geometry and then show, using an Interwrite Pad, how to make patterns. This was part of an integrated unit on Māori culture and we also viewed a DVD showing a powhiri. (2008 comment – integrated)

Allowing children to research topics on the Internet. (2008 comment – social studies)

4.2.2 Customise learning experiences to recognise differences

Customised materials allow content to be selected, modified and paced to meet student needs and interests. The recommendation is that, 'e-Learning may assist in the creation of supportive learning environments by offering resources that take account of individual, cultural or developmental differences' (Ministry of Education, 2007, p.36). Over the course of the study, teachers made increasing use of the laptop to adapt an activity or to provide extra assistance for an individual student (2006–37%: 2007–65%: 2008–67%), and the use of the laptop as a stand-alone tool to individualise learning and to engage students in interactives had grown from just over a third to two-thirds of teachers reporting this use (2006–35%: 2007–54%: 2008–60%), using the laptop to adapt worksheets for students was a task that around 68% of teachers made use of their laptops for 'routinely' and 25% 'occasionally'. This suggests that teachers were making use of the ease with which electronic resources may be adapted and customised. In this way, the laptop could be useful to bring immediacy, authenticity, and ownership to learning tasks, as in the following example.

To access spelling programme from a CD, to model for children, and produced PowerPoints of each spelling level so can show children on big screen monitor – children run class spelling programme independently. (2007 comment – English)

The laptop had accommodated the individual learning styles of children in teachers' classrooms, as in this example:

I believe that it has helped cater for children with varied learning styles, especially children who are stimulated by visual images, to learn. (2007 comment).

Laptops, because of their higher specifications, had proved invaluable for planning programmes for children with special needs:

My syndicate leader, she has a special needs boy in her class and he likes to play games all those reading and writing types of software but we can't get them to work on any of the computers except her laptop so he's using the teacher's laptop to do all these games and activities. None of the other computers will play the games. (2007 focus group comment)

One teacher spoke of using the laptop for helping to address the special needs of a child mainstreamed into her new entrant classroom:

Certainly with mainstreaming…the child in my class with verbal dyspraxia – the specialist programs that we are trying to get funding for and that's where I will use my own personal laptop to put some of those programs on if they don't come with a laptop to use – and we do need a push for specialist programs for a child who doesn't talk. You need to apply for funding for them – they can be very expensive, or they only have one and it gets taken off you after two weeks. It is those children that we are worried about. (2008 focus group comment)

4.2.3 Build partnerships beyond the classroom and expand the community of learners

e-Learning offers the possibility of students to make connections with other students around the world and to participate in and/or create communities that extend well beyond the classroom (Ministry of Education, 2007, p.36). To do this they participated in online discussions and emailed and Skyped with students around the world as the following examples illustrate:

Participation in Learnz virtual field trip – accessing support material, participating in online discussion. (2008 comment – integrated)

Emailing students across the world. (2007 comment – English)

We Skype with a class on Pitt Island using my laptop. … They talk about themselves and can look into our Blog and we can leave messages for them. Their teacher is going to set up a project for the two classes to do together. My laptop can do things that my brand new PCs cannot do. (2007 focus group comment)

By using the laptop and the Internet, teachers were able to enhance the quality of learning for Years 1 to 3 students through sharing examples of how other students had managed a learning experience:

The Monarch Butterfly – we had in the class from egg through to butterfly – we went online to view a video clip by other students and developed our Life Cycle data from our own experience and the new information gained. (2008 comment – science)

4.2.4 Increase modes of teaching and learning

Teachers were using the laptop as a stand-alone tool to facilitate group work (2007–55%: 2008–67%). Many examples were given of student use of the laptop unsupervised in groups, and also individually. In many instances the activities described were games or curriculum-specific software to reinforce learning.

As part of the reading tumble the children have access to my laptop for curriculum-related games. (2008 comment – English)

Rainforest maths for a maths group – independent activities to reinforce learning intentions while the class works on other things. (2008 comment – maths)

Webquest for fairy tales – during reading time the children followed the webquest as part of a group activity. (2007 comment – English)

Teachers were using the laptop to model ways of carrying out learning tasks and in doing so to help make the student learning processes transparent (Alton-Lee, 2003). Routine use of the laptop and peripherals to illustrate a way of performing an activity increased over the evaluation period (2006–12%: 2007–15%: 2008–18%) and occasional use remained around one-third (2006–46%: 2007–45%: 2008–33%).

To model the use of Kidspiration software as a tool for collecting initial ideas about the different ways the children know we use to tell the time. (2007 comment – maths)

> *Portrait sketching, scanned sketches, notes, and photographed model. I hooked up laptop to data projector and played slideshow while teaching sketching skills – students sat on floor with clipboards and pencils and followed visual steps of process. (2008 comment – the arts)*

There was increased use of the laptop as a stand-alone tool for the use of curriculum-specific software in class (2006–46%: 2007–58%: 2008–63%). This enabled students to encounter new learning in a variety of ways and through different tasks, which might be expected to lead to enhanced learning. Animations and video were described in this regard.

> *Made an animation to show the children, plan to work with a small group and show them how to make a very simple animation about penguins. (2007 comment – integrated)*

> *Accessed YouTube for a teaching video on making yoghurt. The children then had an example of how to present a cooking show and then were able to work on their own and be videoed. They learnt a lot about having essential information and speaking clearly. (2008 comment – science)*

By using the laptop to access Internet images from another time and place, teachers could support students to enter and explore new learning environments. For instance, students were able to encounter new learning in a new way through the use of Google Earth to 'fly over a country' or by going on a virtual field trip. This example is from a social studies lesson:

> *Around the world, Google Earth, location of country and a focus on capital cities and get pictures of famous landmarks. New entrant children at the start of visiting each country pretend to fly there using Google Earth. Made comparisons between buildings and locations as part of the topic. (2008 comment – social studies)*

The use of multiple modes of teaching/learning

Children today live in and are comfortable with a digital and visual world. Alton-Lee (2003) noted that teachers can optimise learning opportunities for diverse students by complementing language use with opportunities for students to have access to, generate and use non-linguistic representations such as diagrams, movies and photos. Over the three years there was increased use of the laptop to manipulate images (2006–52%: 2007–59%: 2008–66%). There were numerous reports of teacher manipulation and use of images (static and dynamic) accessed from the Internet, books and other sources including video and digital photographs taken by the children or teachers themselves. For instance, teachers used images to motivate oral language discussion and the writing that followed and often attached photos to the children's writing, thereby customising the learning resource making it more authentic and meaningful for the students:

> *Display photos of hands-on opportunity class have had (using PowerPoint), oral text recorded by children – key vocabulary essential to write about experience displayed. They view images, key vocab, hear oral text. (2007 comment – English)*

This example came from a science lesson:

> *Made a book about wetas. No access to library, so researched on Internet for information, took photos of weta that had been brought to class, put all this together on PowerPoint. I inserted the photos and the children's drawings. (2008 comment – science)*

The next example came from maths:

> *Used digital camera to create sequence of children counting numbers to use as tool to learn forward and backward counting. (2007 comment – maths)*

Videos were used.

> *We were talking about communication, how we did this. We ended up talking about Stephen Hawking and found a Utube (YouTube) video of him and how he uses a small movement on his cheek to communicate via a computer. (2008 comment)*

Teachers reported that students found interactive materials particularly engaging.

> *When connected to the data projector I can do whole-class warm ups using interactive educational websites and also using our school intranet page to guide children to the correct activity for their maths group. (2008 comment – mathematics)*

Discussion

Loveless et al, (2001) who looked at the teacher's role in adopting strategies that will enhance the learning of others where that learning involves deep knowledge of how to deal with information, suggested that there needed to be an awareness of the range of resources and ways of working that ICT makes available to support teaching in curriculum areas. Years 1 to 3 teachers giving examples of how they used their laptops for teaching and learning had begun to see ICT resources as more than simply an add-on to existing resources and strategies. They were beginning to explore how the use of their laptop could open up new and different ways of teaching and learning. They were finding themselves more often in the role of facilitator of learning, modelling ICT tasks, encouraging children to think creatively and to make connections between their learning.

4.2.5 Teacher perceptions of the benefits of their laptop use for their students

In 2008, there were 158 questionnaire respondents who, when asked, commented specifically about the positive impact of their use of the laptop on children's learning. As other research into teacher laptop provision has highlighted (Phillips, Bailey, Fisher & Harrison, 1999; Simpson & Payne, 2005: Sockwell & Zhang, 2003), for many teachers the major benefits to students appeared to be indirect. Thirty-two teachers commented on how the laptop had had an impact on them as teachers, and subsequently an impact on the students. They reported that they were better prepared with more interesting and subject-based resources and that this had impacted student learning. Five teachers said that because their own IT skills had improved, the students had benefited.

> *It has improved the quality of lesson planning thus impacting on facilitating learning. Enabled me to transfer skills to students using the classroom computer, such as access to Internet research. (2008 comment)*

Thirty-one teachers described how their use of the laptop had presented students with another way to learn. Fifteen of these comments were about how the laptop had enabled children to respond to visual images in their learning.

> *It has provided another vehicle for accessing information, interacting with resources and communicating with other pupils and the teacher. (2008 comment)*

> *Being able to view images taken during an event/outing/activity soon afterwards gives them a huge stepping stone for discussion and reflection. (2008 comment)*

> *Meeting children's visual style of learning, appealing to their preference to have highly visual, interactive resources. (2008 comment)*

Twenty-nine of the 158 teacher comments related how their use of a laptop had increased motivation and student engagement in the learning. Children were said to be interested, focused, attentive and stimulated, and they interacted more.

> *Students been very motivated. Their computer skills and knowledge has increased. There's been further learning in other curriculum areas. Less able students have been more engaged in learning via various software. (2008 comment)*

> *They are more interested in learning than before, excited being on the laptops using COWS in the classroom, Boys love to type instead of writing as noticed. (2008 comment)*

> *With the ACTIVboard – immensely. It is so engaging and gets the children totally involved in their learning. Watching the children interact with the ACTIVboard is great for observing their learning. (2008 comment)*

Fifteen comments indicated that the teacher's use of the laptop had increased students' ICT skills. Many of these teachers explained that this was because children saw their teacher modelling laptop use, setting expectations helping students to understand what could be done, and making the learning transparent.

> *It has given them awareness of what can be done – a starting point, an interest, and development of basic skills. They are keen to do more. (2008 comment)*

> *Builds, reinforces children's knowledge of what can be done with ICT, eg, digital images etc. (2008 comment)*

Fourteen comments indicated that the laptop gave students instant accessibility to up-to-date information and learning resources. These teachers had found that this access to a wide range of reference material gave children a greater exposure to the world, thus extending their knowledge.

> *My class programme is based around my laptop – it has made my teaching more interactive, more relevant to student's interests and has allowed us to access things we would not otherwise be able to do with Year 2 children. (2008 comment)*

> *It has been very good for extending high achievers in the area of language and/or topic in searching for information on selected sites. (2008 comment)*

Ten teachers felt that the laptop had brought increased relevance to student learning.

> *By allowing students to see how valuable a tool ICT can have in an educational setting and how to use it effectively to complete a variety of tasks. Also, it is part of their world and it is important that they see it as a natural extension of learning. (2008 comment)*

> *It has made it more in line with what they use at home. Most of them have Play Stations, X boxes, digital TV, computers – so it is closer to their cultural capital. (2008 comment)*

Five teachers commented on how the laptop provided opportunities for extension purposes allowing students to learn to work independently.

> *Yes it has impacted hugely. They are much more capable and are learning so much from home and outside sources – we need to keep up in the classroom. (2008 comment)*

Seven comments mentioned how the laptop helped the teacher to cater for the needs of individual students.

> *Ready access to create personalised resources to enhance learning outcomes for students. (2008 comment)*

> *It is very helpful to the ESOL (English for Speakers of Other Languages) and low achievers, as the visual aids and hands-on access help with their learning needs. (2008 comment)*

Ten of the 158 teacher comments provided a variety of 'other' responses based on use of their laptop in the classroom, thus allowing more students to use a computer during class time. Some found the laptop useful as an extra computer in the classroom for students to use (four comments). One teacher indicated that by using the laptop she had been able to take the children's learning further:

> *It has been a scaffolding tool for them to produce work above what they could present using pencil and paper. (2008 comment)*

Focus group teachers gave similar examples of how their use of the laptop had made a difference in the classroom, many speaking about how their teaching had changed. One teacher, who had used digital learning objects with her class, felt that the children's understanding had been enhanced by them being able to see an animated model of the earth rotating in space. One of her children had gone home to explain the phases of earth and moon to her parents at the dinner table:

> *We were talking about the rotation of the earth in relation to the sun and the moon, and usually we learn about it with a torch and a ball, and it was a chance that they would understand. But putting it on the projector screen and seeing it animated was much more visual. I had a comment from a parent who came in and said that her daughter was explaining the phases of the moon and day and night to the parents over the dinner table, after we had done that. (2008 focus group comment)*

There appeared to be a push upwards through the early learning centres to primary schools:

> *The new entrants would come with their lovely computer-generated things to school – that's where I got my enthusiasm from. (2008 focus group comment)*

One Year 1-2 teacher who used her laptop with an interactive whiteboard was full of enthusiasm for the way it captured the attention of the whole class.

> *It catches the whole class. There are no behaviour issues when that Activeboard is on – they are glued. (2008 focus group comment)*

She said it also allowed children to gain a sense of ownership – 'rather than watch the teacher do it, they do it'.

> *There is an amazing facility – you can take a snapshot of anything on a page up on the screen and it cuts it out. You can then put it on a new flipchart and the kids can make it into a story and move the character all over the board. Everything is manipulative – you can pull it apart, animate it, turn it upside down, put things on top of it, and the children work it out very quickly. If I ever get stuck some little voice behind me will say, 'You don't do that…' (2008 focus group comment)*

Discussion

Teachers' perceptions changed over the three-year period from thinking of the laptop as an extra computer in the classroom or as a teachers' administrative tool, to seeing laptop use as a way of increasing student motivation, engagement with images and giving students access to information and another way to learn. Years 1 to 3 teachers reported that they were using their laptops to expand the learning environment beyond the classroom and to allow

students to encounter learning in a variety of ways through different tasks. The laptop enabled teachers to select, modify and pace content to meet student needs and interests in way that is impossible with written texts and whole-class presentation. In the process of teaching, students were being guided to take responsibility for their own learning.

4.3 Integration of the laptop into teachers' work

Questionnaire data indicated that respondents were making use of the laptops for a range of tasks outside the classroom such as planning, email, collaborative development of lesson materials, reporting, and recording student grades. Focus group teachers were very positive about the wider impact of the laptops, emphasising the vital role that their laptop played in all aspects of their work and indicating that it was now indispensable to their day-to-day work. Indeed, it would appear that the effectiveness of using a laptop for routine classroom management and communication tasks could lead to efficiencies, which in turn could encourage the laptop being utilised in a teaching and learning focus as described in the previous section.

4.3.1 Changes in use for communication

It was anticipated the TELA laptops would support teacher collaboration and communication (Ministry of Education, 2004) and teachers were asked to report on the frequency of using their laptops for activities indicative of communication – contacting colleagues within school and in other schools via email and contacting parents via email.

Evidence of change

Table 5: Change in levels of laptop use for communication (2006-2008)

Use for communication	2006 (n=271) %	2007 (n=340) %	2008 (n=317) %
Email colleagues within school	70	76	82
Email colleagues outside school	57	66	77
Email parents	32	38	49
Email students	9	13	17

Table 5 shows the increased use of laptops for communication. Around four-fifths of teachers were using the laptop to email colleagues within and outside their school by 2008. Written questionnaire comments indicated that email was a required and efficient way of communication in some schools.

> *It is a requirement to use the email and communication system on the school intranet at my school. (2008 comment)*

> *Saves time instead of hunting around the school trying to (find) a specific colleague. (2008 comment)*

Questionnaire comments also suggested that teachers found the laptop invaluable for sharing information, and liked the way they could refer back to a past communication.

> *As I job-share it's a useful way for us to keep updated and tracking what we have done and comments/feedback and information that were previously verbalised can be monitored. The communication is excellent and we can refer to emails etc. (2008 comment)*

> *We plan our units as a syndicate so it is very useful that we are all able to work separately and then combine our parts through access to the school server via our laptops. (2008 comment)*

There were teachers with certain responsibilities in the primary school, such as sports coordinator, who used the laptop as a means to keep in touch with teachers in other schools in order to arrange team sports meetings.

> *Laptop is always set up and I'm often checking it throughout day for internal emails as well as sports emails. (2008 comment)*

By 2008, teachers were increasingly making active use of email to communicate with parents and students.

As more families gained access to the Internet at home, teachers had found communication with parents via email to be effective.

> *We used to bring in the parents to have a look at the work. It was a lot more time consuming – you would get on the phone and have to call them up if the notice didn't get home. We don't do that now as much, partly because parents are working far more than they used to. Now you can do it in five minutes – what you need the parents to know – that is, if they have access – in our school just over 50% have computers. (2008 focus group comment)*

Teachers had built up a good relationship with parents through using email for communication.

> *We get a lot of emails from parents throughout the day and I like that because I can reply to them straight away. (2008 focus group comment)*

This relationship was especially important for parents who were not living together.

> *Lots of our kids have parents who have split, so it's emailed to the 'other parent', or some whose grandparents have moved overseas and they are still really involved with the kids so it is emailed to Australia, so that they still know what's going on and can chat to the kids about things. (2008 focus group comment)*

Years 1 to 3 focus group teachers discussed how their classes contributed to the school website with a class blog.[7] Teachers had received positive feedback from parents who were able to go in and see what their child had been doing.

> *You can put a world map on your Blog and there are little red lights if someone writes in from England – all the hits show up on the map. One of our Dads went to Beijing and we had a ping on China when he took a look at our Blog. (2008 focus group comment)*

Discussion

Year 1 to 3 teachers were increasingly using their laptop for email communication. Communication with parents had become easier with email and with other web-based tools such as Blogging. This had led to more frequent communication with some parents. The upward trend in use indicates that email is now an important means of communication and connection for teachers.

4.3.2 Changes in use for professional dialogue and collaboration

One of the expected outcomes of teachers accessing a TELA laptop was that teachers would initiate professional growth opportunities using their laptops and share their knowledge and resources with colleagues. For the evaluation, teachers were asked to report on the frequency of using their laptops for activities indicative of collaboration and professional dialogue:

- participating in online discussion lists or forums
- accessing the web for professional readings, teacher association newsletters, etc
- collaborative development and sharing of units and lesson materials.

[7] A blog (a contraction of the term 'web log') is a website, usually maintained by an individual, with regular entries of commentary, descriptions of events or other material such as graphics or video.

Evidence of change

Over the three-year period there had been increased use of laptops for the three listed tasks – participation in online discussions, to access the Internet for professional readings, teacher association news etc and for the collaborative development of units and lesson materials, as shown in Table 6.

Table 6: Change in levels of laptop use for professional dialogue and collaboration (2006-2008)

Use for collaboration	2005 (n=271) %	2006 (n=340) %	2007 (n=317) %
Participate in online discussions	19	28	31
Internet – professional readings	79	93	89
Collaborative development/materials	77	78	87

Although just under a third of teachers participated, there was growth in online discussion participation (up to 31% from 19% in 2006). The use of the Internet for professional readings showed a slight decrease and according to focus group teachers, these activities were more likely to happen in their own time at home. Of the 156 teachers who had laptop access to the Internet at home, two fifths (66) had used the laptop for further professional development at home. Of the 87 teachers who had used laptops for further professional development at home, only three-quarters (66) had laptop access to the Internet at home. Focus group teachers, who confirmed that they took their laptops home to do professional reading, said that at the Years 1 to 3 level, they 'put all time and effort into the children, so do not have time to do professional development at school'.

Routine laptop use for collaborative development of materials at school was increasing (2006–42%: 2007–46%: 2008–47%).

> *We are better able to collaborate and share information/resources/planning to enhance learning. (2008 comment)*

Collaboration using the laptops was very important for teachers who job-shared or who were working in isolated rural schools.

> *As I job-share its a useful way for us to keep updated and tracking what we have done and comments/feedback and information that were previously verbalised can be monitored and the communication is excellent and we can refer to emails etc. (2008 comment)*

> *I found the laptop, especially the emails, very helpful when I was teaching Reading Recovery and you frequently required input from a colleague at another school (semi-rural so schools are not that close) or from your Auckland-based tutor. (2008 comment)*

The laptop was said to have fitted well into teachers' professional culture of collaboration. When colleagues also had laptops, teachers had found that resources were easier to share. The work could be done separately and then combined electronically or teachers could take their laptops to team meetings and share workplans and units of work with each other.

> *We plan our units as a syndicate so it is very useful that we are all able to work separately and then combine our parts through access to the school server via our laptops. (2008 comment)*

> *Our meeting notes are saved on the intranet and people can go in and read them – I don't print them off – that saves paper. Most things are saved there so I have my reading plans – go into my folder and grab it*

– I don't have to go and get it printed out they can get it and make the changes they need to make and it's all there –it helps with teamwork and being able to offer things to people. (2008 focus group comment)

One teacher noted how the young teachers, who were very confident, had modelled collaborative laptop use in syndicate meetings and she had learnt from this:

All the young teachers coming on board – I learnt from them. They bring the laptop to syndicate meetings and all work on them together. (2008 focus group comment)

Discussion

Other studies have reported that New Zealand primary teachers value collaboration and the sharing of ideas and resources (McGee, Jones, Bishop, Cowie, Hill, et al., 2002). The laptops appear to have fitted easily with the practice of collaborative development of resources in the junior syndicates of primary schools. Teacher participation in online discussions had grown but remained low. Teachers of very young children raised questions about laptop access to the Internet from home, as they had no time during the school day for further professional reading.

4.3.3 Changes in use for lesson planning and preparation

One of the ultimate outcomes of the TELA scheme was expected to be teachers producing high quality lesson resources and plans that creatively respond to student learning needs. Data across the three years shows excellent progress towards this goal with between 83% and 97% of teachers using their laptops for all listed planning tasks by 2008.

Evidence of change

Table 7: Changes in levels of laptop use for planning and lesson preparation (2006-2008)

Use for lesson planning and preparation	Level of laptop use					
	Routine use %			Occasional use %		
	2006	2007	2008	2006	2007	2008
Use planning templates	74	77	82	19	18	15
Prepare student handouts	72	73	75	21	23	22
Adapt worksheets for students	-	68	68	-	24	26
Access internet information for lessons	56	55	65	28	34	29
Check schemes and units	44	55	55	36	32	33
Access internet for assessment materials	35	38	44	41	43	43
Combine use/other equipment	28	34	38	47	46	47
Review resources for student use	31	34	34	42	44	49

Table 7 shows how the most prevalent 'routine' use of laptops made by teachers across the three years, for lesson planning and preparation, continued to be to make use of planning templates and to prepare student handouts, with between three-quarters and four-fifths of teachers using the laptop routinely for these tasks by 2008, and nearly all teachers making some use of laptops for these purposes. The following example illustrates the way teachers were making use of PowerPoint as an alternative to worksheets to present information and to stimulate student inquiry.

Over the holidays getting ready for this topic, because I was quite excited about it, I spent a lot of time putting stuff onto PowerPoints so I could use it for teaching or for some things I put a question on each PowerPoint so that they could go on and answer those questions. (2008 focus group comment)

Teachers agreed that making use of the laptop with templates for planning was a more efficient way of working. A school expectation for use for planning appeared to be on the increase with around half (53%) of teachers in 2008 (up from a quarter in previous years) saying the school expectation was that the laptop was used for planning. In two of the focus group schools where planning templates were in use, ICT was included as a learning outcome in each learning area, 'to remind us that everything should have ICT content'.

A central professional challenge for teachers is to manage the learning needs of diverse students. 'Adapting worksheets' was a task added in 2007 – as it was evident that focus group teachers appreciated the ease with which electronic materials could be altered to meet the needs of their classes. Over two-thirds of teachers (68%) reported routine adaptation of lesson materials for their students, suggesting that teachers found the laptop supported the customisation and personalisation of lesson materials.

Table 7 shows that by 2008, teacher 'routine' and 'occasional' use of the Internet was 94% for planning purposes and 87% for assessment purposes. Using the laptop in conjunction with peripherals was possible as laptops had higher specifications than desktop computers and could be used with curriculum-specific software, CD ROMs and peripherals. Routine use of the laptop to produce lesson materials both in combination with other equipment such as a digital camera, video or scanner rose steadily over the three-year period, with occasional use remaining stable. The routine and occasional use of the laptop to review resources such as CD ROMs to be used by students increased. Teachers often used games to challenge children and needed to use the laptop to review learning resources to make sure they would complement their teaching.

> *Words Rock is a language program – my basic kids are working on letter/sound recognition and you build up to sentence structure. Punctuation, verbs, adverbs, identifying the differences. I am busy slowly working at it myself and I am up to level 12 and there are about 25 levels. It says 'pick all the words that start with this sound' and then it plays the sound. (2008 focus group comment)*

Laptops have allowed teachers to gather information and to access resources more effectively and efficiently, particularly as they felt that often paper resources were no longer up-to-date.

> *Google brings up resources more quickly than going to the book room. (2008 focus group comment)*

> *It is definitely more efficient planning and there is more access to more resources and more exciting learning – other than photocopy that page and sit down and do it – it's more relevant learning because the resources are up with the technology. It's quicker to find the resources. (2008 focus group comment)*

Using the laptop to keep all lesson materials in one place that was both portable and easily accessible, may also have contributed to the widespread use for planning tasks.

> *Wonderful for storage and retrieval of earlier plans and materials. (2008 comment)*

> *I am able to work in a paperless mode presenting my long and short-term planning to my senior teacher on my memory stick. (2008 comment)*

Only 14 questionnaire respondents commented that they were not using the laptop for their planning.

Discussion

There was increased use of laptops for lesson planning and preparation, with over four-fifths of teachers making some use of the laptop for listed tasks by 2008. Indications are that the teachers experienced efficiencies in lesson planning and preparation with the laptop through greater access to lesson materials. Teachers reported they were utilising the

affordance of the laptop to customise and adapt lesson materials for their students in a manner consistent with the expectations for the TELA scheme.

4.3.4 Changes in use for administration

One goal of the TELA scheme was that teachers would experience significant efficiencies in administration and reporting.

Over the three-year period, there was an increase in the routine use of the laptops for all administrative tasks (see Table 8). In particular, there was increased usage in writing reports for parents (up to 93% from 83% in 2006), recording student grades and monitoring student progress (up to 78% from 62% in 2006), and checking student records (up to 65% from 51% in 2006).

Evidence of change

Table 8: Change in levels of laptop use for administrative tasks (2006-2008)

Use for administration	Level of laptop use					
	Routine use %			Occasional use %		
	2006	2007	2008	2006	2007	2008
Write reports	83	86	93	6	8	5
Record grades	62	75	78	26	21	20
Check lists/records	51	62	65	30	28	29
Check notices	45	49	59	23	22	21
Take notes at meetings	33	39	36	29	34	36
Schedule appointments	11	9	14	13	19	20
Record attendance	9	11	26	2	8	6

There was a noticeable increase in the proportion of teachers routinely using the laptop to record attendance (up to 26% from 9% in 2006). Over half (59%) of the teachers now used their laptops routinely to check school notices; this proportion had increased from 45% in 2006. An increased proportion of teachers occasionally used the laptop to schedule appointments (up from 13% to 20%) and to take notes during meetings (up from 29% in 2006 to 36% in 2008).

As international studies have found, laptops have provided for the streamlining of management and administrative tasks. However, it should be borne in mind that administrative tasks such as writing reports and recording grades and attendance, more than likely depended on school policy requiring such tasks to be done on computers. School expectation for teacher use of laptops for administrative tasks was evident from the comments made by teachers in the first two years of the evaluation, and in the third year when asked to select from a list of possible expectations, around two-thirds of teachers (63%) reported that there was a school expectation to use the laptops to report to parents and do other administrative tasks. Of the 58 comments in the questionnaire on the use of laptops for administration, in the third year of the evaluation, 31 related to efficiencies that had been gained by teachers who used their laptops for tasks such as keeping records, reporting, taking the roll and accessing school notices and information.

> *Administration is where the laptop excels. Fewer piles of bits of paper and everything easily found and able to be edited. (2008 comment)*

> *When you go to write reports or speak with a parent the 'data' is all in your laptop. (2008 comment))*

> *My PD workshops and Curriculum meetings – again keeps track of the information I need to know or share. (2008 comment)*

Focus group teachers discussed why they felt that making use of the laptop for record keeping had become an essential tool in helping teachers to become more child-centred in their teaching: laptops had made the collecting, analysing and dissemination of student and school data more efficient and effective, allowing easier, better statistical comparison.

> *Illustrative comment:*
>
> *Years ago we never compared a group of children with the national norm – we just moved them on. So having all those programs available to analyse the data made us more focused on where we are doing well, where we are going and what we can do about it. So that has been helpful to us as teachers, to have our teaching much more focused on the individual child rather than the class or a group of children which is what it used to be like. We used to do PATs (Progressive Achievement Tests) but we never analysed it – we wrote the result down and went, "Oh, this child is good, this one is not so good…"and that was it, and it was put away. Everyone is now up to date with data analysis and it's so easy to look at and see and discuss in those professional conversations – what are we going to do about it? Because it is on the computer, it is so easy to pull up and use. (2008 focus group comment)*

Teachers could plot their class reading levels and see when a child was at risk. Through this use of data they would know what they needed to teach next. One syndicate leader explained how teachers would bring their laptops to meetings to discuss the use of such data:

> *Sometimes, as a team leader I will get my team to do it – come to next meeting and show me the data and what it means to your teaching focus. (2008 focus group comment)*

Discussion

The findings indicate increased teacher use of their laptop computer for administrative purposes, with resulting efficiencies. There was some indication that increased use could be linked to school requirements or Ministry initiative requirements such as Literacy or AtoL, which in turn related to greater availability and use of electronic student data management systems. An unexpected consequence of teachers recording student data onto laptops, was that the display of data and the ease of analysis had helped teachers to see patterns of achievement more effectively, and to take each child's case into consideration when they planned next steps in learning. The TELA scheme, in providing most teachers in a school with access to a laptop, would seem to have been a key factor in supporting the viability of a shift to electronic administrative systems that in turn increased teachers' use of student data because the electronic data was readily available for analysis.

4.4 Perceived gains for teachers

Questionnaire respondents were asked to summarise what for them had been the most exciting or innovative outcome of having a laptop. The aim was to triangulate the open responses against the fixed response data. Almost three-quarters of teachers (73%) responding to the questionnaire had a contribution to make and their responses have been grouped and summarised in Table 9. Over a quarter of teachers (26%) indicated that the use of the laptop as a motivational teaching was the most exciting outcome of having a TELA laptop. These responses included comments on the difference in the classroom when using a data projector or interactive whiteboard, how the laptop could be used to facilitate learning, and how teachers had enjoyed integrating ICT into their teaching.

One-sixth of teachers (17%) appreciated the flexibility of workspace made possible by having a 'portable computer' so that they could work wherever they happened to be. The same proportion (17%) enjoyed being able to create and/or

customise resources that were of a high quality for their students. A further sixth (16%) had comments about the way the laptop could be the sole repository for all schoolwork, and how they perceived efficiencies as a result of owning a laptop. A similar proportion (13%) reported that they appreciated their greater access to resources and information. A small proportion (8%) reported that the laptop had helped them to gain ICT confidence and skills.

Table 9: Most exciting or innovative outcome of laptop ownership (2008)

Most exciting/innovative outcome of having a TELA laptop (n=230)	Percent	Example of comment
Motivating teaching tool	26%	The motivation it gives students. For example, it provides a different way of presenting information that grabs the students' attention. Use in conjunction with ActiveBoard allows a whole new interactive learning environment. My laptop is my right hand – it has made me able to research activities and knowledge that I can then transfer to children's teaching. To see my 5-year-olds so independent and loving the integration of ICT in their daily programme.
Flexibility of workplace/portable	17%	Being able to work in other areas around the school with my laptop. Taking it to meetings to view things. Taking it home to write reports. Not having to use my home computer so much for school use.
Create, customise resources	17%	It has allowed me to personalise my worksheets specifically for children's needs – yet not look home made. I am able to tailor the learning experiences for the children to have more impact. Learning how to use the programs available now to produce quality resources specifically targeted at junior children. Being able to develop resources using the laptop to share with the children such as digital photo stories and powerpoint story books.
Sole repository/provides for efficiencies	16%	School administrative tasks are now easier to manage. Report writing is easier. Easier to keep files so they do not have to be rewritten each year. Easy access to new ideas and planning assistance. Being able to save onto the computer and not having to collect pieces of paper when we do a new topic/unit! All we have to do is scan on the photocopier and it sends it to our laptop. Enabled me to be a more efficient and effective teacher - through better planning, assessment etc. – due to the wide scope of functions and resourcing that having a laptop provides.
Access to resources/information	13%	Having a TELA laptop has certainly increased my professional knowledge and ability to search for resources/sites/information to enhance integration of ICTs in learning and teaching: the more I find the more I want! The Internet and the ability to find almost anything about anything and show the kids rather than have to wait for a book or use inept descriptions. To use it to access information that is only available on the Internet... eg. YouTubes of tornados in action.
Stimulus to use ICT	8%	My confidence and growth in knowledge in using the computer programs that are available to me – Internet, email, My Pictures, Kid Pix, Inspiration
Tool that supports collaboration	3%	That we are all learning together and that the children or other staff members can often teach me something new. Easy access to information in a variety of locations Being able to plan as a team and flick it to a colleague.

For focus group teachers, being able to find specific resources that were relevant, for their Years 1 to 3 children, was a big advantage of using a laptop.

> *There are so many different types of animation that we can watch. Whereas when you get books from the National Library you have one video for 'Space' for the whole school and it may not even be relevant to what you are doing. (2008 focus group comment)*

> *With the laptop and the Internet you can go and look for more specific things. We wanted to know about the Olympic torch and I found lots of examples and all these videos of previous Olympics and what the torch was like, whereas if we had got a video we would probably have to watch the whole ten hours of the opening ceremony. (2008 focus group comment)*

Making use of the laptop in the teaching day with interactive resources accessed from the Internet and/or in the case of interactive whiteboard users from the libraries that accompany the board, was an effective way of motivating Years 1 to 3 children and in some cases had resulted in shifting the focus of teachers more towards learning together with their children as the following comment shows:

> *It's the interaction that it engenders – you're there having fun with the kids and you're laughing and they're going up and taking risks to do something. And you as a teacher are taking risks learning about it as well. Yesterday we were doing magnets as a school-wide topic – seniors and everybody. I had not explored the ACTIVboard for magnets so we just did it all together. We had all the magnets out and were doing things with them and I suddenly thought, "I wonder what's in the library?" We found a site and up came these templates with bar magnets along the bottom. The kids had to put the bar magnets up in to fill in the gap to make sure that the north and south didn't clash. It was just spot on to what we were doing. We explored that together – it was not me standing out in front saying, 'Do this, do that'. It's good that you have fun with the juniors and learn together. (2008 focus group comment)*

Although a proportion of teachers reported that accessing resources had been made easier for them since they had a TELA laptop, there was discussion in the focus groups about the appropriateness and literacy levels of some Internet-accessed resources. It was not as if a teacher could go to a website and merely pick up some information without sifting through the piece to check, reduce, highlight key ideas and even sometimes translate information; it was more that teachers could use the information to craft a resource for their students. However, there were also places where teachers could find information that was at an appropriate level for direct use by students, such as the National Library site where resources were coded as being junior, middle or senior level.

> *I have a group of very good readers in my room who can read the Encyclopedia but cannot understand it, and when I asked them about the Olympics web page they looked at they could not really explain it to me. That's why I don't use it for research for Inquiry learning. I will find a site that I might print off and highlight key words and phrases but we won't go there unless I am showing them on the data projector. To bring up more children's sites, every time I Google I put kids in front eg, 'KidsOlympics'. (2008 focus group comment)*

In this discussion it also became obvious that teachers needed to realise that very young children may not be at the conceptual level to be able to assimilate certain information, as in this example:

> *The language is too difficult, even the spoken language – I spent a lot of time explaining what was going on – they did not have the concept of 'age' and the amazing thing about the Olympics is, you try to give them a concept of where the world is – they think that China is just in the backyard. Luckily I have two boys who have come from England so they have an idea of 'distance' and can explain that it takes a long time to get there! (2008 focus group comment)*

5. Incentives

To reform their practice in ways that are consistent with the 'spirit' of reforms, most teachers would have to learn new notions about teaching, learning and subject-matter, however, teacher learning is influenced not only by the opportunities that are available for learning but also the personal resources of the teacher, including their prior knowledge, dispositions and beliefs (Spillane, 1999). This evaluation sought teachers' opinions about the factors that had influenced them to integrate ICT into their work.

The incentives for teachers to integrate the use of ICT included the exclusive use of a TELA laptop computer as a result of the Ministry initiative, and if the school took up the opportunity to participate in the ICT PD cluster scheme, teachers were able to be involved in extended professional learning alongside other teachers from their own and other schools. Other Government policies/professional development initiatives appeared to act as an incentive for teachers to use their laptops although it was difficult on account of the number of initiatives a school was involved in. Within schools, there were certain laptop uses expected of teachers, in particular the use of electronic data and administrative tasks such as report writing. There was usually some form of formal professional development for teachers to learn about electronic administrative tasks, and these tasks often led to laptop use in the classroom by teachers but this relied heavily on the school providing teachers with access to a reliable technological infrastructure. It was active leadership that encouraged a collaborative culture in a school for teachers to share effective strategies and techniques that was said to be most effective in leading to the integration of laptops into teachers' professional lives.

5.1 Alignment of Government policies

Teacher commentary highlighted that schools and teachers do not respond to policies in isolation. In New Zealand, the Ministry of Education provided opportunities for schools and teachers to be involved in several initiatives over the period of the TELA evaluation (2002-2008). Teachers described their involvement in AtoL, ICT PD, Literacy, NumPA, e-Learning and Inquiry Learning to name a few. The e-Learning strategy states that teachers 'must be supported in developing and enhancing their own ICT knowledge and skills, through professional learning and consistent ongoing support across the education sector' (Ministry of Education, 2006, p.10), but sometimes ICT and investment in supportive school infrastructure was not considered to be a priority in schools so teachers found they could not use their laptops effectively in the classroom, or were unable to connect to the school network at home to continue their work after school.

5.1.1 ICT PD clusters

The ICT PD model involves schools clustering together to either share expertise and/or to meet together with an expert who leads teachers from all the cluster schools in a new learning about ICT use. Around two-fifths (41%) of Years 1 to 3 teachers were receiving ICT PD cluster training in the final year of the TELA evaluation. The focus group teachers who were mainly from small schools indicated the possibilities for collaboration and learning were greatly enhanced when schools clustered together to share 'what works' and to explore innovative ways to solve problems. Those primary teachers who had been in an ICT PD cluster group were very appreciative of the support of their ICT PD facilitator, liked the hands-on practical ideas, valued visiting other schools in the cluster and had used the laptop to collaborate with teachers from other schools, with some continuing to do this with teachers in their syndicate.

> *ICT PD cluster meetings [were useful] because they gave teachers a chance to share ideas, listen to experts etc. (2008 comment)*

Teachers felt that the ICT PD contract had raised the profile of ICT in schools and the amount of support provided. Some had taken their learning further by taking tertiary level papers.

> *When we did the ICT PD cluster we could do some papers through Auckland University and one of them was Action Research, which is Inquiry Learning, which we took back in as part of our development in schools. And then we went on to do the next one – e-Learning and it was all to do with webquests and how to put webquests together. The assignments were to plan lessons and take them with the kids and share it with the facilitator who gives you feedback and you get points that count towards an ICT qualification. (2008 focus group comment)*

Teachers from schools involved in the ICT PD Cluster programme were able to attend a yearly conference – ULearn and had found this beneficial.

> *As part of our ICT PD cluster we had conferences that we could go to but there are others and you learn so much from them at varying levels. Some people that come in with no knowledge can go to basic courses to try things and others can go to Keynote speakers – I think it is important to be able to take part in them and they should be Government funded because they are expensive. You choose the workshops that are relevant to your Apple or PC system. There's such a wide range of things to go to that you can just have the extra things in your room to enhance what is happening in there and everyone can be a bit more confident with it – you can learn about working with gifted and talented students or how to use ICT with special needs children. (2008 focus group comment)*

Those attending could learn about a new development and bring that knowledge back into their teaching, although some teachers indicated that there was rather too much information and little or no hands-on time with ICT.

> *You pick the areas that you want to go to and you sit there and get browbeaten for two hours, then you go to the next one. I did enjoy it, I loved every moment of it, but it's not hands-on enough. I would rather it was: 'I am going to pick one thing to do and when I come back after three days I am going to know how to do this'. You do get to see all the things that are there, but you do not get the hands-on, I came back with too much. (2008 focus group comment)*

> *I came back from ULearn last year with a digital microscope (that was my own purchase so that it wouldn't disappear into the senior room). For juniors it is fantastic. It is hooked up to your laptop and the data projector screen. (2008 focus group comment)*

Once a three-year ICT PD programme had been completed by cluster schools, some schools were able to keep the alliance going. Rural primary focus group participants reported how the ICT PD Cluster facilitator was kept on by several schools after the contract had finished. The facilitator would regularly call into each school to continue training the staff in ICT areas where there was a need. This initiative could be traced in part to the fact that the principals met regularly to share what was happening in their schools and to support each other. This was another means for supporting each other.

5.2 Other Government initiatives

When a school was involved in a Ministry of Education initiative such as AtoL or NumPA[8], where teachers are encouraged to collect, analyse and act on student achievement data as part of the teaching and learning process, the requirement may have been to pass on digital records to show progress of some sort or another. This amounted in some cases to a significant requirement for teachers to use electronic data, and particularly where this was a whole-school requirement, teachers quickly became accustomed to those uses of the laptop.

[8] The Numeracy Project Assessment (NumPA) is a diagnostic tool that is designed to give teachers quality information about the knowledge and mental strategies of students. NumPA takes the form of an individual interview with students.

> *Part of it (the Literacy contract) is data analysis, comparing your school with other schools. We sent our Star analysis and looked at norms. I've got a wee task to do – to put on the 5 year olds' data that we were reflecting on anyway. The data analysis is very good. (2008 focus group comment)*

The evaluation found that with practice and over time teachers' uses evolved and grew and on occasion an initial requirement led to a school culture of laptop use for certain tasks and then on to more individual and creative uses in the classroom. This did not necessarily occur spontaneously however, as it was more a combination of factors that were found to act as an incentive for teachers to use their laptops.

5.3 Formal professional learning opportunities

5.3.1 School-wide professional learning and development

Where there were expectations within a school for the preparation of electronic materials, for example: student reports; student data recording and analysis; student absence recording; and lesson planning and preparation, whole-staff professional development was often organised by the school in a more formal way to prepare teachers for consistently meeting these expectations. There were after-school meetings to discuss and model activities such as use of the school management system, electronic data entry or report writing using a template. This was also seen as having some value for skill development.

5.3.2 Formal professional development

TELA policy stipulated that teachers would undergo 40 hours of professional development related to the use of the laptop. Initially, there was an issue of apparent inconsistencies across schools in the provision of the mandated 40 hours of professional development. Focus group comment each year indicated that school management and leadership support for teacher laptop use was variable in terms of budgetary allowances for both professional development and hardware/software.

Formal professional development involved individual participation in formal laptop or ICT professional development conducted by an 'expert', where teachers attended regardless of their individual expertise or current need for the knowledge – more of a 'just-in-case' type of professional learning opportunity. By 2008, almost three-quarters (226–74%) of Years 1 to 3 teachers responding to the questionnaire had received formal laptop-based professional development (2006–65%: 2007–71%). In 2008, over half (124/226–55%) of these teachers had received training through being a part of an ICT PD cluster group. When asked what the focus of any laptop-based professional development they had undertaken was, teachers indicated that over the three-year period there were increasing opportunities for learning about the use of the laptop for teaching: the specifics of a software program (2006–27%: 2007–37%: 2008–38%), and support/ideas for in-class use (2006–24%: 2007–34%: 2008–48%). There were also a higher proportion of teachers undertaking formal professional development in the use of school administration systems each year, as this continued to be an ongoing upgrade exercise in schools (2006–24%: 2007–34%: 2008–37%).

Although teachers appreciated school-wide/organised professional development, generic professional development was said to lack immediacy and personal relevance. Furthermore, some focus group teachers noted, and the questionnaire responses indicated, that much of the available professional development was targeted to needs of beginning users. When asked what was the most useful aspect of laptop-based professional development many felt that it was best if there was a hands-on component to the learning, and that to become proficient it was necessary to practise.

> *Helped to motivate me to use web-based programmes, however, I still do not feel confident. I need to use them more and have ongoing support. (2008 comment)*

5.3.3 Professional learning as a process reliant on the individual

Many teachers spoke about professional learning as an individual process that involved exploration of, and experimentation with, their laptops and expressed a preference for time to explore how to use their laptop.

> *Time away from the classroom to develop knowledge on using a different aspect of the laptop and then being able to take a small group from class to train as experts to help teach the rest of the class. (2008 comment)*

> *Really just the confidence to go away and try things out for myself. Gaining ideas about how to use laptop effectively. (2007 comment)*

> *Much of my most recent laptop-based PD has been what I have needed to find out as needed. I am in the fortunate position of loving my notebook and wanting to use it. I frequently help others on staff. (2007 comment)*

Teachers at some schools paid to attend typing/computing night classes themselves, and recognised that having the laptop was a personal commitment.

> *I did a Word course on my own in the evening that helped fill in some gaps in my own knowledge. (2008 comment)*

One-sixth (16%) of Years 1 to 3 teachers indicated 'time to experiment with laptop capabilities and to practise with use for teaching' was the most important factor affecting their use of the laptop in the classroom.

5.4 Technological infrastructure

The school technological/ICT infrastructure has been found to impact directly on what teachers can and cannot do with their laptops. The questionnaire and the focus groups provided teachers with an opportunity to comment on some of the issues surrounding the provision of the infrastructure within which they used their laptops.

As noted earlier, teacher access to the Internet and a data projector had increased over the three years to 96% classroom Internet access and 77% easy access to a data projector. When teachers were asked what technical support was available in schools for their laptops, collegial support for technical assistance remained the most frequent response across the years (2006–80%: 2007–82%: 2008–82%). Around three-quarters (74%) of teachers said their school had an ICT lead teacher or a computer committee (2006–77%: 2007–72%), and over half (52%) were supported by a full-time or part-time technician (2006–49%: 2007–56%). In 2008, two-fifths of teachers said that their school employed an outside expert to assist with technical problems.

> *Illustrative example – robustness of laptops*
>
> Teachers did not necessarily want hi-specification laptop computers in schools; they wanted equipment to be stronger and more robust, able to withstand constant unplugging and being carried around. Some laptop hard drives and many batteries were reported to be 'not lasting the distance' – lasting for 12 months rather than three years.

Teachers appreciated increased access to the school network and Internet from their classrooms over the three-year period. By 2008, almost all Years 1 to 3 teachers (97%) had classroom access to the Internet and just over half (53%) could use their laptop to connect to a wireless network in their classroom. There was an increase in easy access to additional equipment available to teachers over the three-year period, with teachers reporting easy access to digital

cameras (up from 90% to 92%), printers (up from 78% to 80%), data projectors (up from 55% to 77%) and hi-tech photocopiers (up from 28% to 45%). Although still not usually available, the proportion of teachers with an interactive whiteboard had doubled from 7% to 14% over the three-year period. To maximise the efficiency of their use of laptops as a teaching tool, teachers need easy access to additional equipment. When teachers were keen to use their laptops, if they worked in schools where there were few classroom computers and/or a lack of peripherals such as data projectors, teachers felt that expectations for ICT use could not be easily met.

Digital camera use – an illustrative example from a Year 1-3 focus group teacher:

After an ICTPD development day, when we had seen how they worked, I bought four little digital cameras at $40 each and gave them to a group of children to take home and take photographs of anything they wanted around their home and they made up a story of their life on the farm, then the next group took them home. They downloaded the photos onto the laptop and put music with it and their own voices walking you through it. I actually learnt quite a lot about my kids and where they were situated. Some of them live another 20 minutes from my school and I have never been to their farm. I got to have a look at their bedrooms – it was a bit of a scare for some of the parents to see the presentation at the end of the topic! (2008 focus group comment)

5.5 Active leadership

School leadership exercised by the principal, and a small group that included senior management representation and/or expert individuals, was considered important for guiding and supporting school ICT/laptop developments and, consequently, individual utilisation of laptops/ICT. In schools where leadership decides on a school-wide ICT focus, the school essentially becomes a learning community where everyone is learning at the same time and teachers are supported to upskill in the use of ICT for various tasks. Focus group teachers commented that board of trustees[9] support was essential for school development of the infrastructure needed for laptop use. They believed that it was important that board members and principals had access to opportunities to learn about the potential of the laptops. In some rural areas, the principals regularly met around ICT and other matters. These principals were said to be motivated to stay in touch to be up-to-date with their peers, especially those principals in rural sole-charge schools.

5.5.1 Very supportive leadership in schools

Teachers were asked about the influence of the principal, the deputy or assistant principal(s), syndicate leaders and senior teachers, and the position of the ICT lead teacher. Table 10 details the extent to which different school leaders were found to be very supportive in helping teachers to use their laptops effectively as a teaching tool.

Table 10: Very supportive leaders in schools (2006-2008)

Leadership support	2006 (n=271) %	2007 (n=340) %	2008 (n=317) %
Principal	30	29	33
Deputy principal	22	30	26
Syndicate leader/senior teacher	23	26	26
ICT lead teacher	59	60	59

The highest proportion of teachers (three-fifths across the years) found the ICT lead teacher in schools to be very supportive. Around a third of teachers reportedly found the principal to be very supportive and a quarter found the deputy principal and the syndicate leader to be very supportive in helping them to use their laptops effectively as a

[9] The board of trustees is a group consisting of the principal, a staff representative and elected parents that govern the school.

teaching tool. When asked about support from the principal and the deputy principal, teachers at all levels of ability from schools where there were expectations were more likely to say they were very supportive, however, whether or not there were school expectations for laptop use, teachers at all levels of ability found the ICT lead teacher to be very supportive.

5.5.2 School-based expectations for laptop use

School leaders have a role in setting expectations for teacher laptop use – these expectations signal what uses of the laptop are of value in a particular school. In many schools, the first use of teachers' laptops was in the administration and communication areas. There may have been a requirement for teachers to use the school management system to input achievement data and attendance figures, or to use a template available on the school server to write reports which initiated teachers into using their laptops at school – the use of laptops for administrative tasks and report writing was expected by just under two-thirds (63%) of teachers' schools. Staff may have been emailed or asked to email information to the administration or management personnel – in-school email communication was an expectation of around two-thirds of teachers' schools (67%). This teacher gave the example of teachers being required to change to digital recording of the attendance register:

> *When that came in, that we had to do the roll on the laptop, there was a lot of increasing of knowledge, a lot more interest in the laptops from some teachers who were a bit afraid of them. It's on now so you may as well use it for something else. It's been a very good thing. (2008 focus group comment)*

Many Years 1 to 3 teachers reported that there were expectations for their use of the laptops, and in these situations there was evidence that teachers found school leaders to be more supportive and teachers used laptops more frequently and for longer periods. Four-fifths (81%) of Years 1 to 3 teachers in the final year of the evaluation reported that their schools had expectations for their use of laptops – in many cases there were several expectations. In addition to use for administrative tasks, around half of the schools were reported as expecting the laptop to be used for planning (53%) and for classroom teaching (48%).

A higher proportion of teachers in schools where there was an expectation for laptop use (98%) had access to the school network from their classrooms, than in schools where there was no expectation for laptop use (93%), were more likely to use their laptops more than once a day (expectation–81%: no expectation–53%) and for more than eleven hours per week (expectation–40%: no expectation–28%). Years 1 to 3 teachers in schools where there was an expectation for laptop use were also more likely to have received formal professional development in the use of the laptop.

Table 11 looks at how teachers perceived leadership support in schools where there were expectations compared to those in schools where there were no specific expectations for laptop use.

Table 11: Leadership and expectation for laptop use (2008)

2008	Principal very supportive %	Deputy principal very supportive %	Syndicate leader/senior teacher very supportive %	ICT lead teacher very supportive %
Expectation for laptop use (n=255)	37	29	28	61
No expectation for laptop use (n=62)	15	15	16	53

Where there was a school expectation for laptop use, teachers were more likely to feel well supported by leadership. This support was evident in better laptop access to the school network in classrooms, a greater likelihood of professional development opportunities and more frequent use of laptops by teachers in schools where they knew there were expectations for use. This data was supported by focus group commentary. Expectations for teacher laptop use

were not always ‘in writing’. Some teachers in the focus groups knew that the BOT and the principal expected ‘ICT involvement’ or that they ‘like us to do ICT’, but more often than not were unaware of specific expectations apart from having to enter student data onto the school server. Some felt there was ‘not a strong drive’ for laptop or ICT use in the school. Those who were aware of expectations were very positive about using their laptops and extending use into classroom teaching, as they seemed to have become more confident over the three-year period and were keen to learn more about the potential of laptop use in teaching and learning.

The big ‘unwritten’ expectation for teachers was that of making use of the laptop for schoolwork at home. There were 245 comments from teachers who appreciated the flexibility of workplace allowed by the laptop and being able to work at home on a portable computer was considered a positive aspect.

> *The school and local community have increased their expectations of what can be done at home and the standard of work produced, eg, wikispaces, keynote presentations, etc. (2008 comment)*

> *New entrant teacher. I spend more time on classroom cleaning, preparation and displays because I know I can work on the computer after tea. Most days I don't leave school till 5:30. (2008 comment)*

The positive aspects of being able to use the laptop at home included the convenience and flexibility of being able to choose where and when to work. Teachers liked the safety of working at home rather than at school after hours, the comfort of working at home and the way it allowed them to be with their families in a relaxing atmosphere. Having a laptop at home freed up the home computer for other family members. The work they were able to do at home included continuing and completing work, planning, writing reports and emailing. When there was laptop access to the school network and to the Internet teachers found there was easy access to information – a positive aspect of being able to use the laptop at home, as well as the fact that the laptop was the sole repository for all schoolwork. There were sometimes frustrations as well, such as in rural areas where teachers had no laptop access to the school network from home and had to save work onto USB or disc to transfer data to the school network. This was a frustration for at least a fifth of teachers responding to the questionnaire – there were 63 comments in 2008 about difficulties of working at home on laptops.

> *Can’t access files that are stored on school network, have many times been frustrated that I needed to have downloaded documents, templates etc onto my memory stick before leaving school. (2008 comment)*

> *My laptop only prints to school printer, every time I want to print at home I have trouble and have to reinstall the printer. (2008 comment)*

> *I waste a lot of personal time browsing Internet for school/doing school work at home. Costs me more, our school Internet provider subsidy doesn't cover my broadband bill. (2008 comment)*

5.5.3 Support from a designated ICT teacher

In many schools there was a designated ICT lead teacher (74% of Years 1 to 3 teachers reported that their school had an ICT specialist), whose role included upskilling other teachers, helping staff to use new software and even sometimes to be a technical expert and see to any minor repairs. By the end of the three-year evaluation period, around three-fifths (59%) of teachers reported the ICT lead teacher to be a very supportive mentor. The ICT lead teacher in a primary school, although a designated position, did not necessarily mean that the person had an ICT qualification or was given any release time to carry out the expected duties, and was more than likely to be a full-time classroom teacher. Although designated ICT leaders who were lone specialists within a school were often part of an active email network with others, it was evident that these more advanced users also needed opportunities to extend their knowledge and expertise. In interviews, teachers discussed the need for these expert individuals to further their own learning as part of

their own professional development, and also so that the school as a whole could continue to progress. The need for these individuals to have school leadership support and to be skilled in the communication and sharing of ideas was also raised. It would seem that if school leadership does not recognise the value of this 'in-house expert', burnout could result.

> *The ICT leader suddenly decided over the holidays that she didn't want to do it, so she's had all the knowledge but now she is not telling us what has gone on before and needs to be done. I think some of this was to do with the fact that she was doing a lot of it in her own time and she wasn't getting any release to do it. [This teacher had gained an ICT qualification while working in this role and her unfulfilled goal had been to get some release time for ICT leadership in the school.] (2008 focus group comment)*

As well as an officially designated ICT lead teacher, it seemed that all teachers in a particular school were aware of which colleagues had expertise in the use of ICT. These teachers were approached for help on an informal and ad hoc basis. Those teachers in the focus groups who had such expertise discussed the time commitment this involved. Colleagues indicated they were very aware of the demands placed on these teachers but neither group were able to suggest a solution to this problem – both groups acknowledged schools may not necessarily have the funds to employ a designated ICT support specialist. Young teachers who have always used ICT and family members who have expertise in either the use of laptops, or who offer technical expertise, were a part of this group.

5.6 A school culture of collaboration

A school culture of collaboration is likely to be a good incentive for teachers to integrate ICT/laptops into their daily teaching in the classroom. Spillane (1999) in his research into teachers' 'zones of enactment' (referring to the space in which they make sense of, and operationalise for their own practice, the ideas advanced by reformers), found that the extent to which teachers' enactment zones extend beyond their individual classrooms to include rich deliberations about the reforms and practising the reform ideas with fellow teachers and other experts, the more likely teachers are to change the core of their practice.

Teacher commentary in this study attests to the efficacy of professional development, albeit not formal professional development provided by external experts but rather peer mentoring. Teacher learning was heavily influenced by internal factors in a school, such as help from colleagues. There needs to be a collaborative culture in a school for teachers to share effective strategies and techniques for integrating laptops into the classroom. Given the evolutionary nature of ICT and its possible uses, it seems likely that opportunities to share will continue to be important and it is becoming increasingly imperative to communicate and be collaborative via electronic means. Increasingly, it would seem that all teachers have an obligation to use ICT, so that their students are not disadvantaged in comparison with those of teachers who are exploring its use in teaching and learning.

The emergence of a laptop culture within a school appeared to hinge on the interaction of leadership, infrastructure and professional learning opportunities, culminating in a comprehensive systems approach to laptop integration, which encouraged collaboration among teachers in support of laptop and wider ICT use. Where all these factors worked in synergy, teachers were propelled towards collectively changing the way they worked and integrating the laptop/ICT into their professional lives. It is more likely that a school culture will develop when teaching staff have a collective knowledge of the ways ICT might be used in their day-to-day work and an awareness of its impact upon students' learning. Some teachers mentioned that at their schools there was a very collaborative school culture. These teachers found there was a great deal of informal sharing with 'everybody working well together'. Having teaching units on the laptop instead of in a planning book made it very easy to collaborate with colleagues about a lesson and there was a general perception that teachers were gradually doing more of this as they learned more. Knowledge in the school could

be passed from teacher to teacher through a collaborative culture of learning. The benefit of collegial help was that it could be both timely and relevant. This was largely because a colleague was easily accessible and had a reasonable understanding of the individual's particular teaching situation and needs. Teachers preferred professional development that focused on their day-to-day activities and colleagues 'on the spot' were able to fulfil this ideal. Colleagues could support teachers in exploring how their own teaching/learning materials could be adapted/transformed.

Years 1 to 3 focus group teachers who had participated in the ICT PD cluster programme where they not only collaborated with teachers in their own school but had opportunities to collaborate with teachers in other schools, reflected that initially they had no choice but to become computer literate. By the third year of the evaluation, they appreciated their participation and were continuing to be involved in professional learning pursuits – many teachers were wanting to take the 'next steps' in ICT development such as troubleshooting, downloading programs, everything a technical expert would do or to learn 'what other tools are out there and how they might be applicable for me and my teaching – how I can make movies, podcasting and things that are out there that were not there four years ago'. For these teachers, an increased confidence and enthusiasm for using ICT had become significant motivational factors, providing the incentive to sustain and develop this use.

5.6.1 A process that involves immediate colleagues

Sharing ideas with other staff members was mentioned positively as a source of professional development by Years 1 to 3 teachers, with three-quarters (73%) reporting that other teachers in the school were very supportive in helping them to use the laptop effectively as a teaching tool. Colleagues as mentors provided examples of how ICTs could be used with *their* students. They provided access to models of how a laptop could be used in a safe and secure environment; assistance was available when the need for it occurred and in the context where ICT was to be used. Teachers emphasised the importance of opportunities to work in a sustained way with more expert colleagues as mentors. Many Years 1 to 3 teachers (87%) indicated they used their laptops for the collaborative development or sharing of units or lesson plans.

There was discussion amongst focus group members as to whether informal peer mentoring was enough. One view was that input from experts or 'outside people' was necessary to extend thinking, although more time was spent discussing the lack of easy access to regular needs-based professional development.

5.6.2 Organised occasions for sharing

Primary teachers in particular, considered the benefits from peer mentoring were optimised when the whole school focused on ICT and/or laptop use. Typically, this meant that there was senior management support for laptop use. It sometimes meant teachers had access to time to learn during the school day. Individual teachers who had innovated with their laptop/ICT use and/or who had attended a professional development day or a conference were often asked to share their learning with others at staff or department/ syndicate meetings. Some schools ran breakfast meetings for this. These were voluntary but teachers reported that they were well attended and valued.

> *After an area lead teacher ICT meeting, I just say, 'This is what we learnt last time, this is what we set up'. If people want information, they come to see me individually. So you do PD back at school with it. (2008 focus group comment)*

The findings of this evaluation indicate that teachers experienced professional learning for laptop use as a process of individual investigation; a process that involved, or at least was best when it involved, immediate colleagues; a process that might take place across a school as a whole; and a process that could involve teachers working across a cluster of schools to share problems and solutions.

6. Sustaining changes in teacher laptop use

The area of immediate concern identified in this evaluation is the same as that of the Year 4 to 6 teachers' evaluation in 2007 – the need for professional learning opportunities with a focus on the pedagogies that would enable the best use of laptops and ICT at the junior levels.

6.1 Potential for laptop use

Teachers were asked to identify the 'main' area that they wanted to develop for their use of the laptop in their teaching role from a list of four goals. Table 12 shows the proportions of teachers choosing each of four development goals in 2008, and compares these with figures from 2006 and 2007. There was an increasing emphasis on learning about the potential of ICT to support teaching and learning with nearly three-fifths identifying this as a main goal in 2008.

Table 12: Teachers' goals for using their laptops in their teaching role (2006-2008)

	2006 (n=232) %	2007 (n=329) %	2008 (n=293) %
Learn more about the potential of ICT to support teaching and learning	47	52	59
Learn to use/improve ICT skills	27	18	18
Learn how to create/develop teaching and learning resources	14	20	14
Learn about accessing teaching, learning and assessment resources	12	10	9

The goals in teacher focus groups each year were also mainly related to use in the classroom as a tool for teaching and learning, although discussion also highlighted the support needed to achieve this main goal. By 2008, although most teachers had access to a data projector in their school, teachers felt that if they had a data projector or an interactive whiteboard *in their own classroom* they would progress to using the laptop more effectively. Further professional development following involvement in the ICT PD contracts was seen as a goal – teachers wanted personalised professional learning opportunities to help them to use their laptop as a teaching tool in the classroom. At the same time, focus group teachers wanted opportunities to share and learn from others.

6.2 Supporting sustained laptop use

Teachers have shown that in the junior classrooms, laptops have made an important contribution to changing ways of teaching and learning. The laptops alone have not effected this change – they are a part of a system of factors that afford teachers possibilities for change and then help to sustain these changes. The questionnaire identified a number of factors that may have influenced teachers in their use of laptops in the classroom. These covered approaches to leadership support, knowledge sharing and training, school technological infrastructure and time allowances for teachers to grow in confidence. Teachers were asked to note the importance of each factor to their own use of the laptop in the classroom at the time of responding. They were then asked to identify the factor they found most important. The goal was to develop an understanding of how the factors operated as a system of influences. Table 13 shows the factors that teachers felt were 'very important' to their use of laptops in the classroom.

Table 13: Very important influences on teachers' laptop use in the classroom (2006-2008)

Very important influences on teachers' laptop use in the classroom	2006 (n=271) %	2007 (n=340) %	2008 (n=317) %
School networking	69	72	71
Prompt technical assistance	63	72	68
Confidence/understanding	-	70	64
Time to experiment	65	68	62
Easy access to equipment	35	44	55
Leadership support	49	54	51
PD/support	54	58	50
Collaborative culture	41	47	41

Teachers were asked to rate each factor independently and so were able to select more than one factor as being very important. In many cases, they selected a combination of factors. School networking and prompt technical assistance were considered to be 'very important' by between two-thirds and three-quarters of teachers. Confidence and time to experiment were considered to be 'very important' by around two-thirds of teachers. Half of teachers considered leadership and PD support to be 'very important' to their use of the laptop in the classroom. Easy access to equipment meant a lot to an increasing proportion of teachers, a factor that had an increasing influence over the three years (2006–35%: 2007–44%: 2008–55%).

The relative importance of these factors was different for users with different levels of self-reported confidence and ability. Table 14 shows how teachers at each level of ability selected the most important factor.

Table 14: Most important influence on teachers' laptop use in the classroom (2008)

	Total (n=317) %	Expert users (n=76) %	Intermediate users (n=214) %	Beginners (n=27) %
Time to experiment	16	16	17	11
School networking	15	17	15	7
PD/support	15	8	15	26
Confidence /understanding	13	7	15	11
Collaborative culture	14	5	5	11
Easy access to equipment	12	12	13	0
Prompt technical assistance	11	16	10	7
Leadership support	4	4	3	7
School-wide focus on ICT	4	7	3	7
School culture for change	4	7	3	0
No response	3	3	2	11

Looking across the system of factors in 2008, those who rated themselves as expert users identified 'school networking' (17%–15% overall) and 'prompt technical assistance' (16%–11% overall) as the most important influence in a greater proportion than the norm and either beginners or intermediate users. Nearly half of expert users identified technological

infrastructure issues (school networking, prompt technical assistance and easy access to equipment) as the most important influence on their laptop use. Interestingly, a higher proportion of expert users had a perception of the need for a 'school culture for change' (7%–4% overall).

Teachers who identified themselves as intermediate-level users selected 'time to experiment' (17%–16% overall) and 'confidence and understanding' (15%–13% overall) as the most important influence in a greater proportion than the norm and either expert users or beginners. Nearly half of intermediate users identified personal growth needs (time to experiment, professional development, and confidence and understanding) as being most important, suggesting that they were aware of their own knowledge and expertise as a limit on their laptop use. A higher proportion of intermediate users were also aware of the need for 'easy access to equipment' (13%–12% overall).

Those who rated themselves as beginners identified 'professional development and support' (26% - overall 15%) as the most important influence in a greater proportion than the norm and either expert users or intermediate users. Nearly half of beginning users identified personal growth needs (time to experiment, professional development, and confidence and understanding) as being most important.

Teachers are now focused on maximising the use of the laptop in the classroom. Focus group teachers reiterated this goal of learning more about laptop use for teaching.

6.3 A model for sustainability

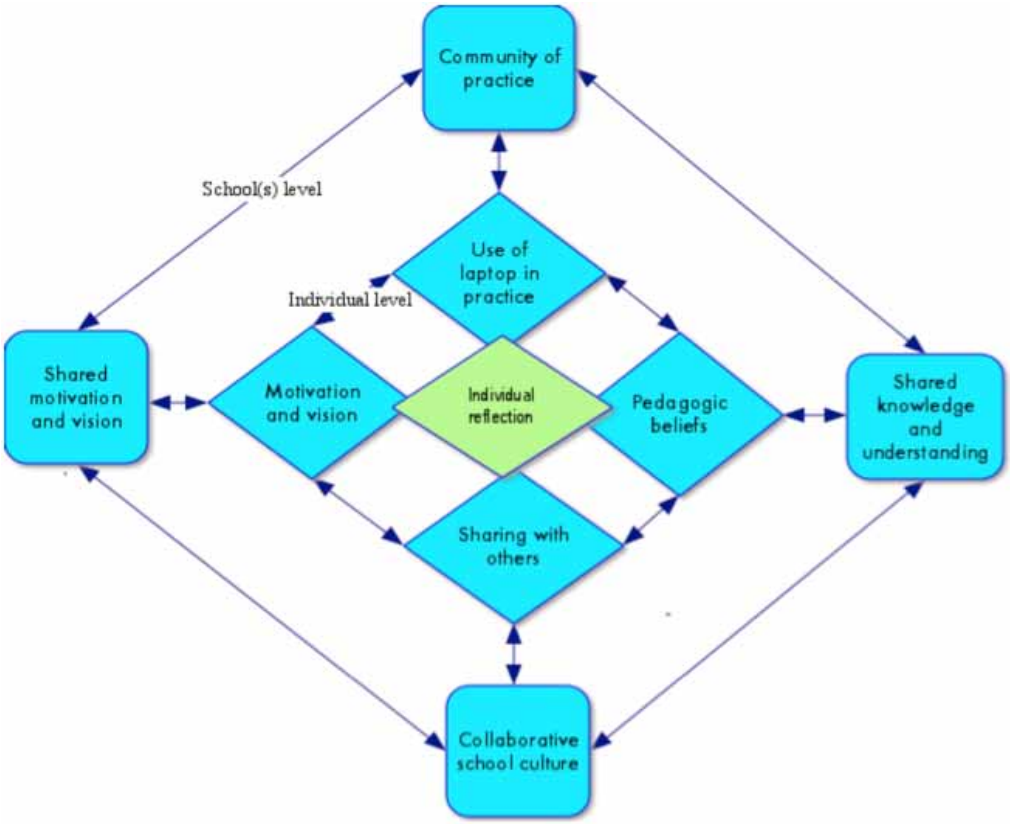
On the basis of their work with 'accomplished' teachers, Shulman and Shulman (2004) stipulated that an accomplished teacher is a member of a professional community who is ready, willing, and able to teach and to learn from his or her teaching experiences. In their terms, being ready is to do with possessing vision; being willing is about having motivation and being able involves both knowing and being able 'to do'. An accomplished teacher is also reflective (learning from experience) and communal in that they act as a member of a professional community. They argue that these aspects need to be replicated at the institutional and policy levels.

Shulman and Shulman show that teachers have different dispositions to change, learning and innovation, but can learn and gain confidence through the social function of sharing expertise with others in similar situations, consolidated through practice and reflection on new knowledge and skills.

The findings of this evaluation show that individual teachers have different dispositions to change (as exemplified by willingness to use ICT), learning (as illustrated by their participation in online discussion, for example) and innovation (demonstrated by their examples of how they used the laptop for teaching in the curriculum areas) but can learn and do gain confidence through collaboration with and peer mentoring from colleagues. This is consolidated through practice and reflection over time on new knowledge and skills as has been illustrated in the findings. Increasing confidence in and enthusiasm for using ICT along with reflective practice would contribute to sustainability and generalisability to further contexts.

The findings of the study also support consideration of the second and thirds levels of Shulman and Shulman's model leading to a 'nested' framework for teacher development in the use of the laptops as shown in Figure 1. The findings indicate that individual teachers are at the centre of a communication, collaboration and practice network that is grounded in the context of their school culte, technology and leadership/vision. Where schools collaborate, as in rural areas, other schools are part of this dynamic framing context. This whole is embedded within the education policy context that provides direction, resources and support (professional development programmes) for what teachers do and how they work.

Figure 1: Levels of analysis: individual and school(s)
(Adapted from Shulman & Shulman, 2004, p. 268)



In this model, the teacher is supported by other teachers within the immediate (syndicate) and school context to develop a shared vision of how the laptop may be used in teaching and learning, and is able to reflect on his or her use of the laptop in the light of feedback and collaboration with others within the community of practice. Hennessey, Ruthven and Brindley (2005) define this as a social framework within which the planning, support, and evaluation of student learning takes place. An evolving pedagogic change as a result of this shared knowledge and understanding is possible as practice, feedback and reflection continues.

Years 1 to 3 teachers in this evaluation considered the laptop to be a valuable tool in the teaching and learning process and many were able to give examples of activities that exemplified effective use of e-Learning as defined by the e-Learning Action Plan (Ministry of Education, 2006, p.10), indicating that for these teachers their role in the classroom might be changing. However, even in schools where an ICT culture had been nurtured, there were individuals, mostly classifying themselves as beginning users who struggled to make sense of new ways of thinking about pedagogy – very few beginners gave examples of laptop use in curriculum areas and those who commented on the impact of their laptop use on children's learning were yet to be fully convinced about such an impact. It appears that given the provision of a sound technological infrastructure and active leadership in the use of ICT, a collaborative culture in a school and in the local community of schools could be the most efficient way of effecting sustainable pedagogic change at the junior level.

Discussion

These findings resemble those of Years 4 to 6 teachers in the final year of their evaluation: with expert users, already confident and proficient in the use of ICT, focusing on the internal supporting factors in their schools; and others striving to come to grips with the wide spectrum of ICT developments and how these might be applied to their professional work and teaching. It would seem that at the beginning, the goal should be to increase the confidence and

understanding of teachers within a collaborative school culture to the point at which they feel comfortable with all ICT tasks. While this is being attended to, school systems need to be introduced along with expectations for laptop use and appropriate professional learning opportunities, along with support in terms of technical expertise and access to peripheral equipment.

The evaluation data suggest that when leadership in the school values ICT use, provides a reliable school technological infrastructure, and supports and encourages a collaborative culture within a school, teachers feel able and are supported by an expectation to share with others, they benefit from wider opportunities to learn new ways of doing things. In this way, the teacher uses the laptop and gains confidence and enthusiasm for using ICT, and can then reflect on pedagogic beliefs and extend the use of the laptop for tasks that are part of the professional life of a teacher.

7. Recommendations

From the findings of this report we have identified implications or options that may have the effect of maximising the TELA scheme and building capacity for teachers to integrate ICT into their professional lives. Implications are provided for three levels of the New Zealand education system: national educational policymakers, school leaders and teachers.

7.1 Policy support for change and sustainability

The findings from this evaluation lend support to the idea that TELA laptops have led to teacher change. Teachers have become more confident in using ICT/laptops over the three-year period of the evaluation and many reported using their laptops in effective ways. This learning took place in the school environment that relied on the support of policy and allocation of resources in terms of equipment and professional learning opportunities for teachers. As has been the case in other year levels of this evaluation, teacher professional learning opportunities and technological infrastructure shape and frame teachers' opportunities for laptop use; each of these aspects is important at any time, but they are important in different ways for different schools, teachers and tasks. The evaluation found evidence of the collaborative nature of the junior school and glimpsed the possibilities for future use of laptops and ICT. We are suggesting that a collaborative approach to teacher development within schools and across local school communities, supported by active leadership at the local level and the allocation of resources at a policy level is required to encourage and sustain the integration of the laptops into teachers' work.

7.1.1 Support for teacher development and the use of laptops for teaching and learning

Over half of Years 1 to 3 teachers identified time, professional development support and confidence as the most important influences on their laptop use in the classroom. In particular, intermediate users and beginners primarily wanted professional development support and time to experiment with laptop capabilities and practice with use for teaching.

We recommend that:

- Schools benefit from continued support in the form of upgraded laptops, reasonable prices for peripherals and ICT technical support, advice and guidance to assist teachers and schools to continue and extend their use of the laptop as an administrative, collaborative and teaching tool.
- The introduction of strategies to allow additional 'time' to experiment with laptop capabilities and practice with use for teaching would be beneficial to teachers.

7.1.2 School leadership

ICT lead teachers play a crucial role in supporting teacher laptop use for teaching and learning. School leaders (the principal, deputy principal, senior teachers and the board of trustees) also play a role in encouraging and supporting teachers using laptops.

We recommend that:

- School leaders be given opportunities to learn about possibilities for ICT use across school management and administration, and for teaching and learning, so they can set expectations for teacher laptop use.

7.1.3 Support for school technological infrastructure development

To maximise the efficiency of the laptops as a teaching tool, teachers need easy, immediate access to additional equipment such a printer, a data projector and a digital video camera. Less than a third of teachers reported having easy access to a data projector. Evidence from almost half of the teachers shows that they would like an interactive whiteboard in their classrooms. Expert users in particular, saw more need for access to equipment and school connections.

Teachers are allowing students to use their laptops when there is a need. Teachers are very enthusiastic about classes where there is the opportunity for students to use a mobile set of laptops.

We recommend that:

- School technological infrastructure improvement programmes be seen as ongoing, as teachers are keen to take advantage of new tools as they are developed.
- Research be undertaken into the use of laptop-plus-interactive whiteboard at the junior levels.

Technical support is a vital component of a school technological infrastructure. It is essential in order to reduce frustration and time wasted that teachers can access help in a timely manner. The cost of outside technical help is generally prohibitive, both in terms of cost incurred and waiting time involved.

We recommend that:

- Consideration be given to funding onsite school technical support positions.

7.1.4 Alignment with other policy initiatives

There was some indication that TELA laptops supported teacher engagement with other policy initiatives and, conversely, that the other initiatives fostered teacher laptops use. Where teachers had been required to make use of their laptops for data entry purposes, particularly where this had been a whole-school requirement, teachers quickly became accustomed to those uses of the laptop. The alignment between, and the cumulative, or not, impact of different policies is worthy of further investigation, particularly in relation to the sustainability in any change in practice.

We recommend that:

- Policy initiatives include teacher laptop/ICT expectations.
- Research be undertaken into the combined impacts of different policies on laptop use.

7.2 Schools

7.2.1 Support for teacher development and the use of laptops for teaching and learning

Teachers found that colleagues in their schools provided the most support for their use of laptops in their teaching role. Those teachers who had been offered the opportunity to be involved had valued their participation in cluster groups where several schools had shared their ICT expertise.

We recommend that:

- Consideration be given to how best to utilise peer mentoring which provides for professional learning that is relevant, timely and easily accessible.
- Schools be encouraged and supported to participate in a school cluster group to share ideas and expertise.
- The focus for future professional development be on how teachers might use the laptop for teaching and learning, and use of the laptop with other equipment.
- Research be undertaken into ways of supporting and enhancing peer mentoring at the junior level.

7.2.2 School leadership

Teachers were not always aware that there were school expectations for their laptop use but when active principal leadership for use was experienced, teachers were more likely to feel well supported by leadership and were very positive about using their laptops and extending use into classroom teaching.

We recommend that:

- School leaders be encouraged to set expectations for laptop use and provide time and support for teachers to be able to meet these expectations.
- Where practical and appropriate, school leaders model use of laptop/ICT for administrative and management tasks, and communication.
- Research be undertaken into the impact of effective leadership on laptop use.

7.2.3 Support for school technological infrastructure development

Teachers were becoming more confident in using school management systems for the bulk of their administration. Nearly all teachers had school network and Internet connections in their classroom. Teachers valued the flexibility and portability of the laptop.

We recommend that:

- Schools consider budgeting for ongoing ICT development, maintenance and the purchase of peripherals.
- Schools be encouraged to provide off-site access to school networks to enable teachers to carry out preparation and planning tasks using their laptops at home and hence take full advantage of the portability of their laptop.

7.3 Teachers

The findings indicate that access to a laptop for their exclusive use resulted in Years 1 to 3 teachers gaining more confidence and capability in the use of ICTs. By 2008, they were making use of the laptops for communication with colleagues, a range of administrative tasks (including reporting to parents), the development of lesson materials, and in the classroom with individuals, groups and the whole class.

7.3.1 Professional development: Developing and supporting a community of learners

As with the Years 4 to 6 evaluation, Years 1 to 3 teachers valued opportunities to share effective strategies and techniques for integrating laptops into the classroom. Teachers valued peer mentoring, which allowed them access to models for teaching students using ICT. Given the evolutionary nature of ICT and its possible uses, it seems likely that opportunities to share will continue to be important. Increasingly, it would seem that all teachers have an obligation to use ICT, so that their students are not disadvantaged in comparison with those of teachers who are exploring its use in teaching and learning. It is also becoming increasingly imperative to communicate and be collaborative via electronic means. It is therefore essential that all teachers have the skills needed for word processing, accessing and searching the Internet and sending emails.

We recommend that:

- Teachers take advantage of what opportunities they have to access professional development on the potential of ICT.
- Peers are the most accessible source of professional development. Teachers would be advised to seek out help from and share ideas with colleagues, particularly those in the same syndicate.

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Appendix A: Evaluation timetable

February – March 2006
Design and carry out initial focus groups (3) (phase 1)
March – April 2006
Develop and administer baseline questionnaire (phase 1)
Analyse questionnaire responses
November 2006
Research Report One – baseline questionnaire and focus groups (phase 1)

February – March 2007
Undertake focus groups (3) (phase 2)
March – April 2007
Develop and administer second questionnaire (phase 2)
Analyse questionnaire responses
November 2007
Research Report Two – second questionnaire and focus groups (phase 2)

February – March 2008
Undertake focus groups (3) (phase 3)
March – April 2008
Develop and administer third questionnaire (phase 3)
Analyse questionnaire responses

15 December 2008
Due date for draft final report inclusive of all surveys and focus groups
June 2009
Final report due

Evaluation Research Reports

Cowie, B., Jones, A., Harlow, A., McGee, C., Miller, T., Forret, M., & Cooper, B. (2006). *Digital Horizons: Laptops for teachers evaluation. Primary levels – Y1-3, 4-6, 7&8. Progress Report. May 2006.* Hamilton: University of Waikato.

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