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**TELA: Laptops for Teachers
Evaluation**

Final Report Years 7 & 8

B Cowie, A Jones, A Harlow with M Forret, C McGee, and T Miller

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TELA: LAPTOPS FOR TEACHERS EVALUATION

Final Report Years 7 & 8

Commissioned by the Ministry of Education

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The evaluation team has appreciated the ongoing contact with the schools and teachers in this evaluation project. Teachers have had a unique opportunity to tell their 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 students, teachers and schools.

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EXECUTIVE SUMMARY

The purpose of this evaluation was 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 (2004-2006) and to record emerging changes in laptop use. This evaluation report presents findings from three annual cycles of national focus groups and questionnaires with Year 7 and 8 teachers in New Zealand primary and intermediate schools.

In this evaluation, two methods of data collection were used: first, two focus groups of teachers in face-to-face meetings and second, a questionnaire sent to teachers in a range of schools. The focus groups allowed teachers to talk about their experiences and changes in their use of the laptop over the three years. Each year, one focus group was held for Year 7 and 8 teachers in full primary schools and the other held for Year 7 and 8 teachers in intermediate schools. The annual 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 focus groups held over three years.

Main findings

As a direct result of the TELA policy to provide teachers with laptops rather than desktop computers, teachers reported that they now had flexibility of time and place for working. Teachers commented on the improved access to resources afforded by TELA laptop ownership, and how the laptop had helped them to become more confident in the use of ICT. The evidence in this report demonstrates that the implementation of the Laptops for Teachers scheme has resulted in progress towards the achievement of the goals for this initiative. It indicates:

- Increasing confidence and expertise with ICT in many teachers;
- Increasing use of laptops to strengthen collegial relationships;
- Efficiencies gained in lesson planning, preparation, administration and reporting; and
- Growing use of laptops for classroom practice and student learning activities.

It needs to be pointed out, however, that there was considerable variation between individual teachers – first, in terms of where they began in 2004, second, their degree of progress, and third, their competence and confidence at the end of 2006. Despite differences in progress, a number of broad conclusions can be made.

1. Confidence with ICT

Over the three-year period, teachers reported improved confidence and expertise with ICT. Nearly all teachers reported they were comfortable with word processing and most were comfortable using email and searching the Internet. By 2006, using graphics, locating information in a database, downloading digital photos, and using presentation software were tasks that between half and three quarters of teachers felt comfortable with.

Since the distribution of laptops to Year 7 and 8 teachers in 2004, there has been an improved confidence and expertise with ICT, with an increasing proportion of teachers reporting that they were comfortable using their laptops for a range of tasks.

2. More effective communication and collaboration

The laptops had enabled teachers to engage in more effective communication with colleague teachers, and to more easily collaborate with them. By 2006, around three quarters of teachers used their laptops for email communication with colleagues. There was a substantial increase in teacher use of laptops for accessing the Internet for professional readings over the course of the three years (2004-69%: 2005-80%: 2006-91%), and for collaboration in developing units and lesson materials (2004-58%: 2005-70%: 2006-82%).

The laptops had enabled communication with a wider range of people, and ease of collaboration among teachers, strengthening collegial relationships.

3. Efficiencies gained

The laptop portability and capacity to serve as a sole repository of teacher working documents afforded teachers flexibility of time and place of work, with the result that many administrative tasks had effectively become less onerous. Over the three-year period, the most prevalent uses for administrative tasks made of laptops by teachers were to write achievement and other reports (up to 90% from 69% in 2004), and to record student grades (up to 62% from 47% in 2004). Two thirds of teachers used their laptops for taking notes at meetings in 2006. There was an overall increased use of laptops for administrative tasks.

With increased connectivity (there was increased laptop access to the school network from the classroom: 2004-66%; 2005-70%; 2006-79%), and up-to-date specifications, teachers found using the laptop allowed them to develop materials that included real-world and up-to-date examples and visuals. By 2006, there was increased 'routine' use of laptops in a range of categories of use for lesson planning and the use of planning templates and shared folders and resources was widespread. The laptops were providing flexibility in time and place for planning and preparation for teaching.

When schools had well set-up and connected administration systems, many teachers found that using the laptop for administration saved time and was more efficient. Laptops provided flexibility in time and place for administrative tasks, and for planning and preparation for teaching.

Improved access to resources afforded by TELA laptop ownership had impacted on lesson preparation, with the widespread use of planning templates, shared folders, and visual and multi-modal resources.

4. Use of laptops for classroom practice

At the end of three years, almost two thirds of teachers made use of the laptop for classroom practice. In 2006, [a new question in 2006] around 60% of teachers reported use of the laptop with students - either with individual students, small groups of students, or the whole class - most of this use was 'occasional' use. By 2006, over half (57%) of the teachers used their laptops with a data projector, and 5% had used an interactive whiteboard in the classroom. There was increased laptop access to the Internet in classrooms (2004-66%: 2005-70%: 2006-83%), allowing more teachers to include images and up-to-date data in their lessons. With

the increased easy access to a data projector (2004-49%: 2005-65%: 2006-70%), the most prevalent use (91%) of the laptop and peripherals was to present visual material, both static and dynamic, as part of instruction to the class.

There were indications from the focus groups and written questionnaire comments that the laptop had increased teacher and classroom student access to information and people leading to changes in the way learning resources were structured. When the laptop was used in a classroom where there was access to the Internet, easy access to digital resources, software and peripherals, teachers had the opportunity to provide multi-modal resources that included static and dynamic images, audio, and real-world data, and to customise learning materials for their students. There were opportunities for students to encounter learning in a variety of ways via the use of the laptop with peripherals such as a digital camera and a data projector, and with software that enhanced the relevance of new learning. Teachers reported instances of their being responsive to students' needs, making links to students' prior experiences and knowledge, and facilitating shared learning. Students were supported to take charge of their own learning, for example, by allowing them to use the laptop to produce *PowerPoint* presentations of their learning. The use of the Internet enabled students to enter and explore new and different learning environments, overcoming the barriers of distance and time.

At the end of three years almost two thirds of teachers made use of the laptop for classroom practice.

There was *increased laptop access to the Internet* in classrooms, which enabled teachers and students to enter and explore new learning environments, overcoming the barriers of distance and time. When the laptop was used in a classroom where there was access to the Internet, easy access to digital resources, software and peripherals, teachers had the opportunity to provide multi-modal resources.

There was *increased easy access to a data projector*, allowing nearly three fifths of teachers to use their laptops with a data projector in the classroom. The most prevalent use of the laptop and peripherals was to present visual material, both static and dynamic images, as part of instruction to the class.

There were *opportunities for students* to encounter learning in a variety of ways and through different tasks by using the laptop with a range of tools or peripherals and with software that enhanced the relevance of new learning.

Teachers reported instances of their being *responsive to students' needs*, making links to students' prior experiences and knowledge, and facilitating shared learning. Laptops allowed teachers to customise and individualise learning materials for their students. Students were supported to take charge of their own learning.

5. Influences on teacher laptop use

School technological infrastructure (networking and prompt technical assistance and easy access to equipment) along with time to experiment and access to professional development, and leadership support were rated as very important by over two fifths of questionnaire respondents. Time to experiment was rated the most important factor affecting teachers' effective use of the laptop by over a quarter (27%) of teachers with a further 17% rating professional development and support as the most important influence. Combined,

access to equipment, prompt technical assistance, and school networking, were rated most important by just under a half (46%) of respondent teachers.

6. Teachers' main goal for their laptop use

Teachers' main perennial goal for laptop use was to learn about ICT as a tool in teaching, irrespective of their level of self-rated expertise in using the laptop.

Implications from the findings

Implications from these findings have relevance for the parameters of the TELA policy, for school leaders and for teachers.

The evaluation indicated that school and teacher use of the TELA laptops is shaped and framed 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 professional learning. Each of these aspects is important at any time but they are important in different ways for different schools, teachers and tasks suggesting a 'nested systems' approach is required to encourage and sustain the integration of the laptops into teachers' work.

- We recommend *policymakers* adopt a 'systems approach' to the development of policy and practices to initiate, extend and sustain the integration of the laptops/ICT into school and teacher work, particularly in relation to teaching and learning.
- We recommend *school leaders* be encouraged and supported to adopt a 'systems approach' to the development of policy and practices to initiate, extend and sustain the integration of the laptops/ICT into school and teacher work, particularly in relation to teaching and learning.

School leader support for and understanding of the potential of the laptops/ICT were influential with regard to the development of a school technological infrastructure for laptops' use along with school organisational support for, and expectations of, a culture for ICT use. Principal personal active use was said to be desirable, but not essential, as long as the principal provided for an overall supportive environment for ICT use.

- We recommend that school leaders, particularly the principal, and including Board of Trustee members, be supported to learn about and lend their active support for the use of laptops/ICT within their schools.

The indication from this evaluation was that irrespective of teacher self-reported confidence, teachers saw a need for further professional development; that is, professional development that incorporated time to explore and opportunities to extend their use of the laptop for teaching and learning including the use of the laptop with other equipment. There was general support for the value of peer mentoring in this. Peer mentoring was considered to provide teachers with help and support that was specific to their needs and peers were usually on hand for ongoing help.

- We recommend that schools be encouraged and supported to make provision for teachers to work together to develop and share ideas and activities for teaching and learning.

- We recommend that schools be supported and encouraged to provide opportunities for on-site 'experts' to continue to extend their expertise including their expertise in mentoring and working with colleagues.
- We recommend ongoing support for schools to collaborate to share knowledge and expertise in ICT use, particularly use for teaching and learning.

A critical mass of laptop teachers was seen to be an important factor in ICT use within a school.

- We recommend that school leaders encourage all their teachers to participate in the TELA scheme as a means to promote whole school focus on and development of ICT use.

Laptops provided flexibility of time and place for working; however, use of this flexibility by teachers was dependent upon school policies for ICT use and their access to a robust and reliable school technological infrastructure (networking and technical assistance). The development of school technological infrastructure has expertise and resource implications.

- We recommend that a mechanism be put in place to ensure that schools have access to advice and guidance about infrastructure development, including the resources and systems needed to operationalise their vision.
- We recommend a mechanism be put in place to ensure that schools have quality access to technical support.

1. INTRODUCTION

1.1 YEAR 7 AND 8 CONTEXT

For Years 7 and 8 of their primary education, most New Zealand children either remain in a full primary school or attend an intermediate school where there are only Year 7 and 8 classes. Others attend middle (Year 7 to 9/10 and Year 7 to 13) schools. Data were accessed from Year 7 and 8 teachers from full primary and intermediate schools for the evaluation of the impact of the TELA scheme. In this report the findings are not differentiated by school type unless there was a marked difference in the data. Some differentiation was made where support provided by the different school types is discussed. It should be noted that on the whole, Year 7 and 8 teachers in full primary schools received their laptops a year before Year 4 and 6 teachers, and two years before Year 1 to 3 teachers in the same school, so certain support mechanisms may not have been 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, 2002a). In 2006, Digital Horizons was superseded by the new e-Learning Action Plan for Schools (Ministry of Education, 2006a) 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 (up to 0.8) teachers in schools that opted into the scheme to have access to a laptop for a 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, 2002b). 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.

¹ <http://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.

1.3 LAPTOPS FOR TEACHERS (TELA) EVALUATION

The purpose of the evaluation summarised in this report was to investigate the impacts of TELA on Year 7 and 8 teachers' work over a period of three years beginning in 2004 (see evaluation timeframe in Appendix A). The particular focus of this long term (2004-2006) evaluation project was to explore the impacts on teachers' professional growth and collaboration; on their lesson planning, preparation and administration; on their access to and the quality production of teaching, learning and assessment resources and on classroom practice. Information over the course of the evaluation has been gained through yearly cycles of questionnaires, which were informed by yearly cycles of focus groups and vice versa.

1.4 STRUCTURE OF THIS REPORT

This final report is a summary and synthesis of the three years of data collection (2004-2006) carried out with Year 7 and 8 teachers who were participants in the TELA scheme.

The report begins by providing background information regarding the TELA scheme and how the scheme fits within the international setting for the use of laptops/ICT in education. The evaluation methodology is explained in section three, and in section four the impacts of teachers' access to a TELA laptop on their professional work are examined. Enablers and constraints for teacher laptop use are described in section five. The report looks at how teacher laptop use might be sustained and accelerated in section six. Section seven outlines where teachers see the future of laptop in schools, and recommendations at national, school and personal levels are made in section eight.

2. INTERNATIONAL TRENDS: ICT IN EDUCATION/LAPTOPS FOR TEACHERS

Internationally, governments have endorsed the need for teachers to be ICT literate and have invested heavily in computers for schools under the apparent assumption that access to hardware will transform schools and education. Despite the rhetoric about the potential for ICT to transform schooling, there is no definitive, unequivocal evidence that it does this, or that the use of ICT necessarily enhances student learning (Becker, 2000; Cuban, 2001; Dwyer, 2003). It seems that ICT is just as likely to support traditional as innovative pedagogy (Pelgrum & Anderson, 1999). It can just as easily replicate and reinforce current practices as it can transform them (Cuban, 2001). As Kerr (1991) pointed out in the early 1990s, it is not enough to simply acquire technology and leave cultural and pedagogical issues unattended. This said, some researchers have queried whether the methods used to assess learning and achievement gains have focused on the 'wrong' things by "looking for improvements in traditional processes and knowledge instead of new reasoning and new knowledge, which might emerge from the ICT use" (Cox, Abbott, Webb, Blakely, Beauchamp, & Rhodes, 2003, p.8). Still others have argued for a wider conceptualisation of the impacts of computers on teachers' lives consequent on the introduction of new technologies such as the Internet (Beebell, Russell & O'Dwyer, 2004). A wider conceptualisation of impacts is consistent with the goals of the TELA scheme.

A portable computer

While much of the research into ICT in education has concentrated on teacher use of school computers, educational authorities in Australia, Great Britain, New Zealand and the United States of America, have moved recently to provide laptops to teachers. Research is only just beginning to explicate the impact upon teachers, schools and students of teacher use of a portable computer for their exclusive use. There is some evidence from the United Kingdom that laptops can support increased communication between teachers, students and parents and greater sharing of information between teachers (Cunningham, Kerr, McEune, Smith & Harris, 2003). Teachers reported increases in ICT confidence and competence with perceived positive impacts in the classroom. Nearly all teachers developed the quality and range of their IT skills regardless of the baseline from which they were starting (Cunningham et al. 2003; Deakin University, 2002). The portability of laptops was said to give teachers more options than desktop computers. They appreciated the continual everyday availability of laptops that afforded them flexibility in place and time of work. Teachers acknowledged the advantages of 'having everything in one place'. Teachers reported that a laptop afforded them greater access to resources for lesson preparation and provided for the streamlining of management and administrative tasks. Teachers felt they were gaining maximum impact from their laptops when used in conjunction with peripherals.

Indirect benefits

Phillips, Bailey, Fisher & Harrison (1999) reported on the 'Multimedia Portables for Teachers Pilot Project' run in the United Kingdom by the British Educational Communications and Technology Agency (BECTA), where two teachers in more than 500 primary and secondary schools were presented with multimedia portable computers for one year. The pilot led to a significant enhancement of the IT skills of the great majority of teachers. Gains were evident regardless of the baseline from which they were starting; however one reason for the success of the scheme was the time teachers gave to it. The major benefits for students

appeared to be indirect, through teachers' increased expertise in creating high-quality classroom materials and improved access to resources. Amongst the claims made, increased student motivation and availability of information to students featured, as well as teachers being better able to address different learning styles with a laptop computer. A Scottish pilot study (Simpson & Payne, 2005) in both primary and secondary schools considered the reasons the project had been more successful in primary schools, and concluded that primary teachers had benefited from collegial support to integrate ICT use into the curriculum that was less 'stuffed' than the secondary curriculum. Simpson and Payne also attributed success to the fact that primary teachers had, over a long period of time, had a computer in regular use in their classrooms and had already generated models of how the teacher might use ICT technology in classrooms to enhance learning. In a laptop pilot where twenty-seven teachers at a school in the United States received laptops, the perceived benefits of teacher use of laptops versus their use of desktop computers were categorised as mobility and portability, accessibility and convenience, ownership and confidentiality, productivity and efficiency, and connectivity to a data projector (Sockwell & Zhang, 2003). Teachers who had formerly shared desktop computers with other teachers or students now had a sense of ownership of the technology they were using (see also the study by Deakin University, 2002). Exclusive access to a portable computer also encouraged teachers to think strategically about IT issues in schools (Deakin University, 2002). Unlike studies of laptop classrooms where both the teacher and the students have access to a personal computer, these reports do not go so far as to say there was an impact on student achievement as such.

This study builds on this research to examine the ways that New Zealand teachers used laptop computers over a three-year period, the benefits they experienced, and the factors they considered influenced the uses they made of their laptops.

3. LAPTOPS FOR TEACHERS (TELA) EVALUATION

3.1 EVALUATION FOCUS

The Ministry of Education 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 focus of this evaluation was to monitor the impacts of the TELA scheme on teachers’ professional lives with particular emphasis on the impacts on administration and management, lesson planning and preparation and classroom teaching and learning. The goal was to understand these impacts so that the scheme might be adjusted to best support the integration of the laptops into school and teacher practices.

3.2 EVALUATION METHODOLOGY

The TELA evaluation design was to use three yearly cycles of annual nationwide questionnaires, and regional focus groups, while fieldwork was taking place across two other project teams. The questionnaires provided prevalence data on different types of teacher use of the laptops and the kinds of support they had experienced for these uses. The focus group component allowed for in-depth exploration of the issues associated with teacher use of laptops in a manner that allowed participants to build on each other’s ideas and introduce topics of interest to them (Morgan & Krueger, 1993). Focus group discussions illuminated the questionnaire data and contributed to the adaptation of the questionnaire to reflect what was happening in schools over the three-year period.

3.3 PARTICIPANTS

3.3.1 Questionnaire respondents

For the questionnaire, the contract specified a sample of approximately 500 teachers including teachers with laptops from a stratified sample of ten percent of intermediate schools with laptops, the numbers being made up with Year 7 and 8 teachers from other types of schools. An investigation revealed just over half of Year 7 and 8 students attended intermediate and a third attended full primary schools and so the decision was to make the initial selection from the full primary schools. From a pool of 1097 schools, a random sample of every twelfth full primary school generated a sample of 76 schools and an estimated pool of 200 teachers with laptops. There were 80 intermediate schools from which a random sample of 21 was created. The final sample of schools with Year 7 and 8 students consisted of 89 non-intermediate schools (76 full primary schools, 12 composite schools and 1 restricted composite school) and 21 intermediate schools.

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 third term of 2004, and then again towards the end of 2005 and 2006. 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.

The number of respondents was 175 in 2004, 153 in 2005, and 149 in 2006. Thirty-seven schools returned completed questionnaires in 2004 (14 intermediate, 21 full primary, 2 composite), 43 in 2005 (13 intermediate, 29 full primary, 1 composite), and 70 in 2006 (12 intermediate, 52 full primary, 2 composite, 1 special). Laptop teachers represented schools in all deciles, mostly in urban areas, and all schools were co-educational.

Nearly all teachers had a teaching role in their school. Around a fifth were heads of department, syndicate leaders or senior teachers. Each year around a quarter (2004-23%: 2005-26%: 2006-30%) of questionnaire respondents had responsibility for ICT in their schools. Across the three years there was a drop in teachers who had between 0-5 years of teaching experience (2004-38%: 2005-31%: 2006-25%), and an increase in those with 6-15 years of experience (2004-26%: 2005-32%: 2006-37%). Just over one-third in each year of the evaluation had spent more than 15 years teaching (2004-36%: 2005-35%: 2006-38%). The proportion of female respondents rose over the three years (2004-56%: 2005-67%: 2006-70%).

3.3.2 Focus group respondents

Focus group schools were selected on their geographical location and reasonable proximity to a main centre with due regard given to achieving a spread of school socio-economic status, gender, and size. Having selected the schools, the researchers contacted the schools initially by phone followed by documentation by letter. Where schools declined to be part of the study, they were replaced by other schools that were fairly similar 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.

There were two focus group meetings each year – one for intermediate schools and one for full primary schools. Each year, six teachers from three intermediates and between four and six teachers from four to six full primary 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 provided as a space to share ideas and examples of practice using ICT. Discussion was lively and positive.

3.4 EVALUATION FRAMEWORK

Initially, research on teacher adoption of ICT tended to discuss teacher personal, professional, and contextual factors as if they were independent (Zhao & Frank, 2003). This contrasts with recent research on teacher and organisational learning which construes it as much a situated social process as an individual process (Putman & Borko, 2000; Senge, 1994; Spillane, 2004). It also contrasts with current research on teacher use of ICT which positions ICT as a tool that shapes, and is shaped by, the immediate and wider school environment in which it is deployed (Lim, 2002; Zhao & Frank, 2003). Added support for the need to focus on teacher laptop use in context, comes from research that has sought to explicate what contributes to the sustainable systemic use of ICT, which has highlighted the role of national policy in shaping the context for ICT (see for example Kozma, 2005; Olson, 2000; Selwyn, 2002; Venezkey, 2004). Taken together, this research indicates that any evaluation of teacher use of laptops needs to take into account the setting in which teachers find themselves, along with their personal preferences and views, in order to understand how and why they come to use technology in different ways over time. This approach is consistent with what Patton (2002) has described as the “Interdependent System Relationship Maps” conceptualisation of evaluation.

In a 'systems evaluation' approach the phenomenon under study is understood as a complex system that is more than the sum of its parts. The focus is on the complex interdependencies and system dynamics that cannot meaningfully be reduced to a few discrete variables and linear, cause-effect relationships (Patton, 2002, pp.40-41). The main question to be answered is, 'How and why does this system as a whole function as it does?' In this case, the system is conceptualised as greater than the sum of the parts.

A system is a whole that is both greater than and different from its parts. Indeed, a system cannot be validly divided into independent parts as discrete entities of inquiry because the effects of the behaviour of the parts on the whole depend on what is happening to the other parts. The parts are so interconnected and interdependent that any simple cause-effect analysis distorts more than it illuminates. Changes in one part lead to changes among all parts and the system itself. Nor can one simply add the parts in some linear fashion and get a useful sense of the whole. (Patton, 2002, p.120)

The TELA evaluation therefore sought to identify and portray the system or set of inter-related factors that affected the integration of the laptops into teachers' professional lives with the goal of developing an understanding of how and why teachers come to use technology in different ways over time.

3.5 EVALUATION TIMETABLE, EVALUATION REPORTS AND DISSEMINATION

The evaluation timetable may be found in Appendix A where it can be seen that evaluation findings were presented in the form of evaluation 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. Interim findings have been presented to key stakeholders. One research paper has been given at a national educational conference on the Year 7 to 8 data (Harlow, Cowie & Jones, 2006), and as results from other primary levels come in there will be further papers that include findings from the Year 7 and 8 evaluation. This final report of the Year 7 and 8 findings should be viewed as one element in a total utilisation process.

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 ability to use the laptop and were given three categories from which to choose – ‘expert’, ‘intermediate’ and ‘beginner’. As can be seen in Table 1, there was an overall increased confidence in using the laptop over the three-year period. The proportion of those who rated themselves as ‘expert’ increased from around a sixth to nearly a quarter over the three-year period, with the proportion of those who rated themselves ‘beginners’ dropping from just under a fifth to under a tenth.

Table 1 Perceived ability to use a laptop (2004-2006)

	2004 %	2005 %	2006 %
Expert users	17	20	24
Intermediate users	64	61	69
Beginners	19	20	7

Consistent with teacher reports of increased ability to use a laptop, the proportion of teachers who were comfortable using their laptops for a range of tasks including word processing and email also increased over the three-year period of the study. Table 2 compares the figures from 2006 with those of the first two years. Over four fifths of expert users were already ‘comfortable’ with seven of the tasks in 2004. The proportion of those who rated themselves as experts who were also comfortable with movie editing, creating and using and database, and creating web pages dropped between 2004 and 2006, perhaps due to a greater proportion of teachers identifying themselves as expert in 2006. There was little change for intermediate users over the three-year period. Beginners, however, appeared to be considerably more likely to be comfortable with word processing, searching the Internet and using graphics than they had been in 2004. It was comfort in using graphics, locating online information, downloading images, using presentation software and spreadsheets that distinguished ‘experts’ from ‘intermediate’ level users.

Table 2 Percentages of teachers who felt ‘comfortable’ (2004-2006)

	Expert (%)			Intermediate (%)			Beginner (%)		
	2004 (n=29)	2005 (n=30)	2006 (n=36)	2004 (n=112)	2005 (n=93)	2006 (n=103)	2004 (n=34)	2005 (n=30)	2006 (n=10)
Word processor	100	100	100	97	96	97	59	77	90
Send/receive emails	97	100	100	87	91	87	53	52	50
Search Internet	97	100	100	86	88	86	42	59	60
Use graphics	97	97	97	64	65	64	15	10	22
Locate online information	97	93	89	46	54	52	13	23	10
Download/use images	-	-	83	-	-	40	-	-	0
Use presentation software	90	97	92	37	51	39	9	3	10
Spreadsheets/charts	86	80	81	28	35	30	3	10	0
Movie editing software	66	60	40	11	11	14	3	0	0
Create/use database	59	47	39	10	10	10	0	3	0
Create web pages	34	27	26	3	4	5	0	0	0

In 2006, a new category of task was added to the questionnaire after discussion with the focus groups, who were making use of their laptops to download photos from digital cameras and images from the world wide web. Nearly half (48%) of the questionnaire respondents reported they were ‘comfortable’ with using the laptop in this way. As can be seen in Table 2, expert users were twice as likely to be comfortable as intermediate users (expert users - 83%: intermediate users 40%). The same is true of teachers who felt comfortable using their laptops with *PowerPoint*: (expert users - 92%: intermediate users 39%).

4.2 CHANGES IN USE FOR ADMINISTRATION

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

Evidence of change

Table 3 Changes in levels of laptop use for administrative tasks (2004-2006)

	Level of laptop use					
	Routine use %			Occasional use %		
	2004	2005	2006	2004	2005	2006
Write reports	69	85	90	17	7	5
Record grades	58	68	74	25	21	21
Check lists/ records	47	48	62	28	33	25
Check schemes	35	36	53	31	33	31
Take notes at meetings	-	-	30	-	-	35
Check notices	23	33	27	12	13	26
Schedule appointments	9	8	13	12	13	13
Record attendance	7	6	10	5	3	4

Over the three year period there was a steady increase in the routine use of the laptops for writing reports for parents (up to 90% from 69% in 2004), recording student grades and monitoring student progress (up to 74% from 58% in 2004), and, checking student records (up to 62% from 47% in 2004). A new task identified in 2006, the taking of notes during meetings, saw two thirds of teachers (65%) making some use of the laptop. There was an overall increased proportion of teachers who checked school notices, mainly due to increased occasional use, up to 26% from 12% in 2004. In two other administrative areas (scheduling appointments and recording attendance) there continued to be fewer than a quarter of teachers who made any use of the laptop.

Discussion

It needs to be borne in mind that these administrative tasks more than likely depended upon school policy requiring such tasks to be done on computers. Indeed, in 2006, two thirds (66%) of Year 7 and 8 teachers reported that there was some school expectation for teacher laptop use. Of the 90 teachers who gave details of these expectations, 69 teachers cited administration tasks that were expected to be done on the laptops: report writing (34); keeping records, assessments, and test results of student achievement (28); writing individual education plans [IEPs] (3); newsletters (2); and accessing school information (2). As international studies have found, laptops have provided for the streamlining of management and administrative tasks. In schools where the administration systems were digital and all teachers used their laptops to contribute to record-keeping, whole-school analysis had become more comprehensive.

Changes can also be seen to depend upon schools having adequate network facilities and systems set up to deal with school and student data. In each of the three years, nearly all Year 7 and 8 teachers (143-96%) reported that their school had a school network. Over the three-year period there had been a modest but steady increase in the proportion of teachers who had laptop access to the school network in their classroom (2004-66%: 2005-70%: 2006-79%). There had been a bigger increase in the availability of laptop access to the network from the staff work area and the library, with a rise from a half to around four fifths having access from the staff work area from 2004 to 2006, and a rise from around one third to two thirds having access in the library (see Table 4). Teachers using their laptop for administration in the staff work area were likely to have had opportunities to share ideas and may have preferred common work areas when carrying out administrative duties.

Table 4 Network access via laptops in schools (2004-2006)

	2004 (n=175) %	2005 (n=153) %	2006 (n=149) %
School networked	97	93	96
Classroom access	66	70	79
Staff work area access	50	85	81
Library/information centre access	39	57	66

Focus group teachers were using their laptop for the same range of administration tasks, such as entering and analysing student achievement data, taking staff meeting minutes, emailing absences to the office, submitting news' items to daily notices via email, and sending newsletters to parents via email.

I have set up templates for teachers to use to analyse their PEN data and that data can now be sent on to the high schools – we all have the same program – that seems to have come out of increased confidence – knowing that it won't get 'lost'. (2006 focus group comment)

According to focus group teachers, attendance was still done manually by most schools but then entered by the school office onto the computer. School notices were still sent around by messengers in some intermediate schools. Email was more often used for notices within the school, and if parents wrote their email address on the first response to the school newsletter, some schools would email the school newsletter to parents. When schools had well set-up digital administrative systems, teachers found that using the laptop for administrative tasks saved time and was more efficient.

4.3 CHANGES IN USE FOR COMMUNICATION

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

The questions on communication were expanded in 2006 to distinguish between email contact of colleagues within and outside the school, and to include email contact with parents and students. The resulting data in Table 5 show the use of laptops for communication especially in 2006 categories.

Table 5 Change in levels of laptop use for communication (2004-2006)

	2004 %	2005 %	2006 %
Email colleagues	71	79	-
Email colleagues within school	-	-	74
Email colleague outside school	-	-	79
Email parents	-	-	49
Email students	-	-	27

In each of the three years, around three-quarters of teachers were using email to contact colleagues. The 2006 data show that nearly half of the teachers were contacting parents via email and just over a quarter were communicating with students via email.

Discussion

Evidence from the focus groups suggested that email was becoming a common form of communication in schools. The provision of a permanent record of communication that teachers could easily revisit was seen to be an advantage of email. So, too, was the fact that communication could be asynchronous, so that teachers could send a message at a time of their convenience.

Teachers email each other – you then have a record of what you have said to each other and can go back and refer to the conversation. (2006 focus group comment)

In some cases, a school expectation that teachers would use email as a communication tool had motivated teachers to make use of this facility. Focus group teachers commented on how, now that every classroom had

email access, teachers had more effective access to parents, apart from when parents themselves did not have email addresses. In some cases students were emailing work from home to their teachers. One ‘digital classroom³’ teacher in an intermediate school found that the laptop was ideal to transfer communications between teacher and students.

The students work at their computers and drop work into the mark folder that I access through my laptop. In a lesson someone will volunteer to show the others what they have done so far and I will get their work and put their work up on the data projector. We can then discuss it and maybe ask someone who has done something different and then I show them that. (2006 focus group comment - digital classroom teacher)

4.4 CHANGES IN USE FOR COLLABORATION

One of the expected outcomes of the laptop scheme was that teachers would initiate professional growth opportunities using their laptops and share their knowledge and resources with colleagues. 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; and
- Collaborative development and sharing of units and lesson materials.

Evidence of change

Over the three-year period there had been increased use of laptops for the three listed collaborative 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 collaboration (2004-2006)

	2004 %	2005 %	2006 %
Participate in online discussions	16	25	23
Internet – professional readings	69	80	91
Collaborative development of materials	58	70	82

Discussion

While the growth in online discussions was modest, the increases in the other two categories were more substantial, indicating that nearly all teachers were accessing professional readings via the Internet, with just over four fifths involved in the collaborative development of materials. Some focus group teachers reported that laptops had made a difference to the collaborative culture of schools and with more sharing of ideas, teachers increased in confidence.

³ This digital classroom had 30 computers for student use. Teacher expectation was that by the end of the year students would be using the computers for 80% of their work. Skills were taught as needed and students had input into programs needed for tasks. Students used each other’s expertise to gain proficiency.

I've seen a lot more sharing of ideas as they have got more confident. They come in and they have found this website or this software, come and have a look at this. There is a lot more of teachers gathering around computers. (2006 focus group comment)

In 2006, responses to a new question asking how frequently teachers took their laptops to meetings (30% routine use: 35% occasional use) indicated that the flexibility of place of working that other studies had found was replicated in the findings: laptops being taken to staff and syndicate meetings to record discussions and to plan collaboratively.

We can sit around in our syndicate meetings with our laptops and they can talk to each other. They will send data to each other. The laptops are wireless. In our school we have a variety of laptops as new teachers come on board. It was all accidental - we were typing away when all of a sudden they started beeping and all this data got transferred! (2006 focus group comment)

It has become a part of the staff meeting, whereas two years ago it wouldn't have been. (2006 focus group comment)

4.5 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. The laptop was expected to help teachers to experience greater efficiencies in lesson planning and preparation. Data across the years show some progress towards this goal.

Evidence of change

Table 7 Change in levels of laptop use for lesson planning and preparation (2004-2006)

	Level of laptop use					
	Routine use %			Occasional use %		
	2004	2005	2006	2004	2005	2006
Prepare student handouts	66	74	82	26	19	14
Planning templates	-	-	71	-	-	21
Internet/info & assessment material	51	58	-	33	32	-
Internet/information for lessons	-	-	68	-	-	26
Internet/assessment items	-	-	47	-	-	42
Check schemes and units	35	36	53	31	33	30
Review resources for student use	22	31	38	46	46	40
Plan to combine use/with other equipment	21	25	34	36	35	41

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 prepare student handouts and worksheets, with four fifths (82%) of teachers using the laptop routinely for this task by 2006, up from 66% in 2004. Combining 'routine' and 'occasional' use it can be seen that nearly all teachers (96%) were making some use of their laptop to prepare student handouts (92% in 2004). Using planning templates was a new task added in 2006 as a result of focus group discussions, and 71% of teachers reported they used these routinely with an additional 21% making some use of planning templates.

Accessing the Internet, to access information to help plan or prepare lessons and to access assessment related documents, was a combined option until 2006, when as Table 7 shows, these tasks were separated. By 2006, the combined 'routine' and 'occasional' use of the Internet was 94% for planning purposes and 89% for assessment purposes, with over two thirds (68%) making routine use of the Internet to access information for planning purposes.

The routine use of the laptop to check schemes and units, review resources such as CD ROMs, to be used by students, and to produce lesson materials in combination with other equipment such as a digital camera, video or scanner showed some increase over the three-year period. In particular, over half (53%) of the 2006 respondents reported that they were routinely checking schemes and units, up from a third (35%) in 2004. This suggests either that these materials were now more likely to be electronic, teachers were collaborating more around these materials, and/or that teachers were now more confident or competent in accessing these materials. The occasional use of laptops for these three tasks remained relatively stable.

Discussion

Between 75% and 96% of teachers were making some use of their laptops for all the listed planning tasks by 2006, a pattern that mirrors studies elsewhere that have also found that laptops afford greater access to resources for lesson planning.

Consistent with the e-learning strategy (Ministry of Education, 2006a), focus group teachers emphasised the benefits of planning using and with electronic resources which offered ease of editing and customisation. Specifically, they highlighted the use of templates in both individual and shared planning. A common format meant that it was easier to interpret and adapt plans sourced from colleagues.

From the years gone by it is easy to go back to the programmes you have taught edit, cut, copy and paste and it is so easy. Downloading planning from the Internet. Sharing planning templates with other teachers. (2006 focus group comment)

In schools where there was an across-school module being taught, an electronic master plan could be accessed and altered to suit the year level being taught. A plan in one subject area could be altered for use in another subject; programmes that had been taught previously could be kept, referred to and altered to suit in a later year. Using the laptop for planning meant that it was easy to provide notes for relievers when necessary. Planning to use the laptop with peripherals was possible as laptops had higher specifications than desktop computers and could be used with curriculum specific software, CD ROMs and peripherals. Focus group teachers said they found it easier to keep up with what was happening in a subject area via sites like TKI⁴, and assessment resource banks accessed on their laptops.

⁴ Te Kete Ipurangi The Online Learning Centre. TKI is a bilingual portal-plus web community which provides quality assured educational material for teachers, school managers, and the wider education community. It is an initiative of the Ministry of Education.

4.6 CHANGES IN CLASSROOM PRACTICE

One of the Ministry of Education's expected outcomes of the laptop scheme was that teachers would create and tailor teaching and learning resources that would meet the learning needs of students, and that teachers would creatively introduce these learning resources in the classroom using a variety of appropriate technologies and pedagogies.

Evidence of change

Each year the questionnaire asked teachers about three areas of classroom use, but in the third year expanded the categories for use with a data projector. However, Table 8 shows the overall use in the classroom over the three years.

Table 8 Changes in use of laptops for classroom practice (2004-2006)

	Level of laptop use Routine and occasional use %		
	2004	2005	2006
Teacher access to Internet	53	71	70
Classroom presentation	42	57	57
Curriculum specific software	29	54	56

Teachers' use of laptops to access the Internet during lessons remained stable after an increase in 2005. In 2006, around 70% used their laptops either 'routinely' or 'occasionally' to access the Internet during lessons, whether or not they had access to peripherals. A similar trend occurred regarding classroom presentations and the use of curriculum-specific software, with an increase in use during 2005, with the higher level of use maintained in 2006.

By 2006, the focus group data were rich enough to justify extending the questionnaire categories for classroom use to include how teachers used the laptop with and without peripheral devices, such as a data projector.

The use of the laptop as a stand-alone tool in the classroom

The 2006 data indicated that just under three quarters of teachers made some use (either 'routine' or 'occasional' use) of the laptop as a stand-alone tool in the classroom to view work produced by students or the teacher and to access the Internet during lessons. Between half and two thirds of teachers used the laptop for all the other specified tasks as listed in Table 9.

Table 9 Use of laptop as a stand-alone tool (2004-2006)

	Level of laptop use					
	Routine use %			Occasional use %		
	2004	2005	2006	2004	2005	2006
To view work produced by students or teacher	-	-	26	-	-	48
Teacher access to the Internet	15	18	25	38	53	45
As a source of text for reading	-	-	17	-	-	34
To provide extra assistance to individual students	-	-	16	-	-	47
To manipulate images	-	-	16	-	-	42
Curriculum-specific software	7	9	13	22	45	43
To engage students with interactives	-	-	7	-	-	50

The use of the laptop-plus-peripherals in the classroom

Teachers' easy access to a data projector or interactive whiteboard had increased in 2005, then levelled off in 2006 (2004-49%: 2005-65%: 2006-62%). In 2004 and 2005, fewer than a fifth (2004-10%: 2005-15%) of teachers made routine use of the laptop-plus-data-projector during lessons; (2004-32%: 2005-42%) respectively made occasional use. These figures may be compared with the 2006 figures that show that for the 93 teachers (62%) who did use their laptops with peripherals, there was a higher level of use across the diversity of uses listed: as Table 10 shows, around two thirds of teachers made some use of the laptop for each of the listed tasks.

Table 10 Use of laptop-plus-data-projector/interactive whiteboard (2004-2006)

	Level of laptop use					
	Routine use %			Occasional use %		
	2004 (n=175)	2005 (n=153)	2006 (n=93)	2004 (n=175)	2005 (n=153)	2006 (n=93)
Do a classroom presentation	10	15	-	32	42	-
Present visual material	-	-	29	-	-	46
Introduce a topic	-	-	19	-	-	45
Present student/teacher work	-	-	20	-	-	41
Show CD ROMs/DVDs	-	-	18	-	-	47
Deliver instruction	-	-	16	-	-	49
Illustrate way of performing an activity	-	-	16	-	-	42
Build Internet into lesson	-	-	12	-	-	43

The use of the laptop within different curriculum areas

Each year, teachers gave examples of their uses of the laptop in lessons, and in 2006 linked these examples to a curriculum area (Table 11 shows number of examples in each curriculum area). These examples are reported in detail in Research Report Four (Cowie, Jones, Harlow, Forret, McGee & Miller, 2006, pp. 33-37). While it is not possible to draw a definitive conclusion from these numbers, they do suggest that teachers are using their laptops in a range of curriculum areas, and in language and social studies in

particular. The examples in 2006, also indicate the laptops are being used to manage the learning process, by using the laptop to: make use of the Internet or *PowerPoint* introduction to introduce topic; show learning intentions to children; use mind-mapping program for brainstorming; search for information; and cut and paste to print.

Table 11 Examples of laptop use within curriculum areas (2006)

	2006 (count)
Language (English)	30
Social studies	15
The arts	10
Science	9
Mathematics	7
Health & physical education	6
Technology	4
Integrated units	17

Discussion

In line with other studies, the evaluation found that teachers felt they were gaining maximum impact from laptops when used in conjunction with peripherals, although they were creative in their applications of the laptop when it was being used as a stand-alone computer.

I use the specialised software Clicker 5 to produce personalised books for students to read during their reading programmes. It is also used as an assisted word processor during writing sessions. (2006 comment⁵)

Students typed in an acrostic poem, then took a digital photo of themselves and put it onto the laptop with the poem. (2006 comment)

An extra classroom computer to work with manipulating photographic images, looking at video editing effects. (2006 comment)

There are indications that student research is part of the work done at the Year 7 and 8 level, and that laptops have been particularly useful for teachers who are now able gain easy and immediate access to a vast body of information and simulations and virtual worlds. This allowed teachers to respond immediately to student queries when classroom internet access was available. The examples given illustrated how teachers have made use of the possibilities for the visual representation of ideas, and the presentation of student thinking and work, including that generated by the class as a whole and by students working individually and in groups. Teacher description of their laptop use in the curriculum areas of language and social studies indicated how the scope of reported classroom uses fits into and aligns with current policies on effective teaching (Alton-Lee, 2003; Ministry of Education, 2006b) and effective teaching using ICT as outlined in the e-learning action plan for schools (Ministry of Education, 2006a). In the area of language, for instance, teachers commented on their use of the laptop to model good writing habits, the use of templates for

⁵ Where a quotation is identified by a date and 'comment', it comes from the questionnaire responses of that year. Other quotations are identified as coming from focus group participants.

producing booklets, and how to make a piece of writing visually appealing through incorporating images. There were examples of teachers using images to stimulate writing. In this way teachers can optimise learning opportunities for diverse students by complementing language use with multiple opportunities for students to have access to, generate and use non-linguistic representations (Alton-Lee, 2003). In social studies, students searched the Internet for images, used KidPix, or used photographs taken by the teacher or other students to present their learning. The laptop was used with students to create a website, and to conduct a webquest. Teachers were using videos and *PowerPoint* presentations to present images from another time and place, allowing their students to explore new learning environments, overcoming barriers of distance and time (Ministry of Education, 2006b). Teachers encouraged students to take charge of their own learning (Alton-Lee, 2003), by allowing them to use the laptop to produce *PowerPoint* presentations of their learning. There were examples of teacher practice that facilitated shared learning, where students and teachers talked about the learning experience (Ministry of Education, 2006b). Teachers had used the laptop with CD ROMs or curriculum specific software, and as a result, students were encountering learning in a variety of ways and through different tasks (Ministry of Education, 2006b). Examples of laptop use in other curriculum areas exemplified some of the other effective teaching principles, such as the use of software to enhance the relevance of learning, for example, the use of Inspiration software for brainstorming in an inquiry learning topic. They also provided evidence of opportunities to learn outside the classroom for group-learning opportunities that recognised individual differences in the classroom (Ministry of Education, 2006a).

4.6.1 Student use of teachers' laptops during lessons

Increasingly, Year 7 and 8 teachers responding to the questionnaire saw benefits coming from student use of their laptops. Over the three-year period, the proportion of teachers responding to the questionnaire had been allowing students to use their laptops rose from a third to a half (2004-34%: 2005-47%: 2006-51%). Just under a tenth (9%) allowed 'routine' student use. Student access was 'never' given by around half of teachers (2004-66%: 2005-53%: 2006-49%).

Supervised student use of the teacher's laptop was common according to teachers in the focus groups with students using their teacher's laptop as an additional computer for a variety of tasks including:

- Posting work into a folder on the server for teacher to access, mark and post back (digital classroom);
- Making *PowerPoint* presentations;
- Making use of the laptop-plus-digital camera and the data projector;
- Manipulating photos; and
- To keep in email contact with students overseas.

The focus group teachers provided detailed descriptions of successful activities. For instance, one teacher described the motivational impact of being able to use her laptop plus a video and digital camera. She considered that the nature and quality of the work the students produced was more than she would have received if they had had to present the material in a paper-based written form. She explained:

Every student has a file and I have too so all the work goes through that. They email work from home. The kids came up with incredible ads for a whole school campaign against rubbish. The news they put on is just incredible. They love it and the work that I've got out of kids that I would struggle to get them to write a page or two. The motivation when they can get in and use the video camera and digital camera and my laptop is just incredible. Definitely, it has been driven because of my laptop. (2006 focus group comment)

This teacher allowed reluctant writers to use her laptop:

If you put a computer and a laptop beside each other the kids will go straight to the laptop. Reluctant writers find it easier to improve and change their work and it facilitates enquiry learning rather than just gathering knowledge from a book. (2006 focus group comment)

4.7 BENEFITS OF THE TELA SCHEME

Each year, teachers were invited to make any additional comments at the end of the questionnaire. Up to half of these comments regarded the benefits they perceived of having a laptop. When 2006 questionnaire respondents were asked what the main benefit they believed they had gained from their use of the TELA laptop, 88 teachers responded. Responses reflected those of previous years and are summarised in Table 12.

Table 12 Main benefit of laptop ownership (2006)

Main benefit gained from use of TELA laptop (n=88)	Percent	Example of comment
Flexibility of workplace	31%	Instantly accessible – on desk, very little space needed. Separate from computers used by children. Saves time – no need to save files to disc to take home – can carry the laptop when necessary.
Sole repository/saves time/provides for efficiencies	23%	Expectations on teachers have increased and laptops have enabled some of us to manage our workload by being more efficient. Everything in one place.
Exclusive access to a computer	15%	Not having to use my home computer for school things. Immediate access to a computer that is mine and I don't have to share with other people.
Stimulus to use ICT	13%	I feel able to try new things and that the laptop has 'kick-started' me into using ICT in my teaching role.
Motivating teaching tool	8%	Students are more motivated and more engaged when laptop was used to introduce to motivate them, e.g. show off an object a student had to describe to the whole class. The engagement and interest was a lot higher for all students.
Access to resources/information	5%	Meaningful use of technology as a tool, easy access to information and resources. Children have benefited from fast, efficient access to visual information that can be manipulated in a variety of ways.
Tool that supports collaboration	5%	We can sit around in our syndicate meetings and they [the laptops] can talk to each other. Being wireless, they will send data to each other.

Almost a third (31%) of the comments referred to the flexibility of time and place of work that the laptop allowed because it was a 'portable' computer, and could be used at school and at home. An unanticipated, but not surprising benefit of laptop ownership, was that teachers (23% of comments) had found the laptop became a sole repository for all their work, with the result that they felt they were better organised and more professional. Teachers (15%) appreciated having exclusive access to their own personal laptop as this meant they could access resources at their convenience. The laptop had motivated teachers (13%) to learn more about how to use ICT in their work; each year teachers expressed a desire for professional development to

develop their ICT skills. Other benefits included how the laptop had helped to motivate student learning, enabled access to a wider range of information and supported teacher collaboration.

Focus group teachers felt that the laptop had enabled them to become more proficient and confident in the use of ICT. After three years, focus group teachers reported that they now made use, to some extent or another, of the laptop for everything professional and personal, communicating, internet research, lesson planning and preparation, student data analysis, presentations, and reporting to parents, BOT and ERO. Laptop access was said to have benefited the whole school (In 2005, Year 1 to 8 teachers all had access to a laptop).

Having the laptops has developed our whole school. Everybody is using them. Computers have been used a lot more since we have had laptops. (2006 focus group comment)

The laptops have been great because we now have more time for teaching in a sense. (2006 focus group comment)

4.7.1 Distinguishing features of laptops that have enhanced teaching

The concept of affordances comes from Gibson's (1979, cited in Erstad, 2005, p.223) theory of ecological psychology, and has been important in studying the consequences of new technologies in school-based learning environments. It implies a focus on the possibilities that the distinguishing features of new technologies offer for student learning activities and teacher practices within the school environment. While the patterns of use outlined here parallel those in research on teacher use of computers, laptops afford different opportunities for teacher use of ICT in the classroom due to their portability, the opportunity for teacher exclusive use, and their generally higher specifications than existing school computers.

Portability and exclusive access

The portability of the laptop allows for an expansion of the teaching and learning environment. Teachers appreciated being able to take the laptop home to work on rather than stay at school to do administration, lesson planning and preparation, and reporting. Opportunities to use the laptop during activities such as Learning Outside the Classroom (LEOTC), assemblies, and class camp were being taken up by teachers, with the resulting effect of a richer, broader learning environment for students. Use of the laptop and a digital camera at camp encouraged students to take risks, and enabled them to relive the feeling of success.

At camp there were some high ropes and scary things they had to do like we had taken photos using the digital camera and at night had the laptop set up with a slideshow of all the activities that the kids had done. On the first day they thought, 'We are not doing that', but after seeing what others had done the next day they were all really keen – take a photo of me! Every kid was given a CD of the photos for a dollar. (2006 focus group comment)

The laptop provided a forum for feedback and discussion between teacher and students for curricular and extra-curricular activities.

I use it for sport. I take the A netball team and take a video of them playing then show it afterwards and say, 'look this is what you are doing wrong,' and often 'we need to look at this technique.' (2006 focus group comment)

TELA laptop ownership had facilitated shifts in teacher practice and student engagement. In some classrooms, the more flexible learning environment had allowed teachers to become more like a facilitator of learning, than a deliverer of instruction.

The laptop had had a huge impact in the classroom – they [the students] in many respects become the teacher, showing me strategies, etc. for an end result. (2006 comment)

Over half (57%) of Year 7 and 8 teachers who used their laptops as a stand-alone tool in the classroom had used it to engage students with interactives. Teachers had found that students were more motivated and engaged when they included an interactive component in the lesson, particularly when students could actively participate in managing the learning. Through the use of visual tools, teachers were able to facilitate students becoming knowledge constructors.

Currently use with a data projector to view NetGuide Challenge – children building websites about their community history. They select their own topic but must relate it to the community where they live where there will be a 50th Jubilee in November. (2006 comment)

Better access to multimedia resources

A central professional challenge for teachers is to manage simultaneously the complexity of learning needs of diverse students and the laptop has made this challenge a lot easier as teachers create and adapt resources to the needs of their students. Used with digital resources, software and peripherals, the laptop allows for customisation and individualisation of learning materials. Focus group teachers asserted that resource materials included in lessons have become more varied and can be adapted to suit the diversity of learners in the primary classroom. In particular, those who learn best in a visual way were said to be well catered for.

Children are visual learners and are often more easily motivated by visual images than voice and text. (2006 comment)

Use of the laptop with peripherals (data projector/interactive whiteboard/server/Internet data-logger/DVD/CD ROM) allowed easy whole-class learning instruction and interaction.

I select text from the net or other area, and use this as a shared text, by displaying it with a data projector. Students can read along and we discuss language features, vocabulary etc. (2006 comment)

The laptop allowed for the production and display of multi-modal materials - representation of ideas, instructions and student thinking and work. Laptop teachers found different ways of presenting information for different students, for example, animations and dynamic images, and could generate student interest by providing real-world examples. In this way, the laptop brings immediacy, authenticity and ownership to learning tasks. Teachers using laptops could make use of personal material to create ownership for learners and provide feedback on individual learning. Laptops allowed teachers to incorporate images, names and events that the whole class could share. Used as a stand-alone portable computer, sometimes with specialised software, the laptop could be used with small groups and individual students with specific needs. Around a

quarter (22%) of Year 7 and 8 teachers had used their laptops with DVDs and/or CD ROMs. This had a motivational aspect in that it ‘hooked in’ students and allowed for relevance, real-world examples, and ownership.

I used the specialised software Clicker5 to produce personalised books for students to read during their reading time. (2006 comment)

Increased connectivity and networking

As laptop access to the Internet in the classroom has improved, one of the impacts of teachers’ laptop use on student learning has been to help them make connections across learning areas as well as connections to home practices and to the wider world. Questionnaire and focus group data indicate that classroom access to the Internet was increasing. Teachers had used the laptop to access the Internet and so expanded the learning environment from the traditional classroom setting by allowing students to go on virtual field trips, to bring real-world examples into the classroom, and to communicate with students in another country.

This year we have a family travelling [overseas] and we are keeping in contact with them as they travel. (2006 comment)

Using the laptop to access Internet images from another time and place, has allowed students to explore new learning environments, overcoming the barriers of distance and time.

Used to show children a variety of images from the French Impressionists. (2006 comment)

Teachers using laptops connected to the Internet in the classroom have immediate access to a wide range of information and people, for research, and simulations. By using digital technologies and the Internet, teachers and students were able to produce resources that included visuals, audio, real data and so on. This changed the way learning resources were defined and could be utilised - resources were becoming more multi-modal, dynamic and interactive, and were linked to the world outside the classroom.

4.7.2. The indirect benefits of teachers’ laptop ownership on students

John and Sutherland (2005) examined the ways in which ICT can be used in educational settings to enhance teaching and learning. They argued that it was the relationship between the pedagogy within a subject area (the practice in the setting), the subject domain and its culture (the ecology of the setting) and the technology (the tool within the setting) that was crucial to engendering quality learning. They cautioned that there has been an optimism that new technologies would extend children’s capabilities as their affordances were used to transform learning outcomes, whereas there was nothing inherent in ICT technologies that guaranteed learning.

There was some indication that teachers felt their use of a laptop had made an impact upon their classrooms. In 2006, there were 65 questionnaire respondents who commented specifically about the impact of their use of the laptop on children’s learning. As other research into teacher laptop provision has highlighted (Phillips et al. 1999; Simpson & Payne, 2004; Sockwell & Zhang, 2003), the major benefits to students appeared to be indirect, with twenty-eight teachers commenting on how the laptop had had an impact on them as teachers, and subsequently on the students. They reported that the laptop had made planning easier, produced better

quality resources, and freed up time for them to spend with students. Sixteen teachers related how their use of a laptop had increased motivation and student engagement in the learning.

Students are more motivated and more engaged when laptop was used to introduce or motivate them, e.g. show off an object a student had to describe to the whole class. The engagement and interest was a lot higher for all students. (2006 comment)

Twelve teachers commented that their use of the laptop had **extended** students' **knowledge through** being able to **access a variety of** realistic and **up-to-date resource material**. Eight teachers described how they had used the laptop to provide opportunities for individualised learning, extension, and students with special needs, such as ESOL students. Three teachers reported that the laptop encouraged **students** to learn from others and share **knowledge**, and provided a connection between home and school. Overall, teachers felt that their laptop use was beneficial for student learning, as these two comments show:

Dramatic impact. A wider range of learning resources are easily stored and accessed. Technology is appropriate to this generation of learners. (2006 comment)

I already used a PC for most presentation work but having a laptop dedicated to school has enabled me to get smarter with what I do. I have no comparative achievement data but can't see modern kids tolerating primitive presentation. (2006 comment)

Focus group teachers were aware that students liked to use computers for their learning and therefore it was essential that they (the teachers) were seen to be up-to-date and 'ICT savvy'. The laptop had enabled teachers to use ICT in their teaching and thus motivate and engage students more easily, however, much of the discussion was about the impact of student use of the teacher's laptop. The benefits, enablers, and constraints listed by focus group teachers regarding student use of the teacher's laptop are shown in Table 13.

Table 13 Student use of teacher's laptop (2006 focus groups)

Benefits	Enablers	Constraints
<p>Increased motivation to complete work.</p> <p>Presentation and content of student work has improved.</p> <p>Students can use laptop as an extra high-spec computer.</p> <p>Appeals to students who want instant 'everything'.</p> <p>Laptops have driven use of ICTs by students.</p> <p>Laptops have made digital learning a reality (digital classroom).</p>	<p>Students have own passwords to log on to the school server to access photos taken by teacher for their work.</p> <p>Additional equipment accessible – digital camera, printer, data projector, etc.</p> <p>Students have flashdrives (USB) to bring work to school from home (digital classroom).</p>	<p>A perceived gap developing between those who have grown up with technologies such as computers/Play Stations and those who have never used computers/played electronic games.</p>

There was discussion in the focus groups about the way children liked to have ‘instant rewards’ and the possible effects that television, texting and computer use had on students’ perceived ability to do more than one thing at once, such as talk while they text. Some teachers felt that, as a result, students had limited attention spans – students were used to TV, PlayStation, and computer games, and some teachers found that it was not possible to talk to them for ten minutes any more. However, they admitted that the strategies and skills involved in computer games paralleled independent enquiry learning skills. In addition, they had noticed the speed at which low achievers, coming from a low socio-economic area without access to home computers, were able to acquire computer skills.

Another focus group teacher who was in a ‘digital classroom’ where all the students had access to a laptop elaborated on the benefits of this access. She explained how the learning had become more inquiry-based, and how she had been able to “push them to higher order thinking skills”. She found that the students were more motivated, interested and engaged, with the result that their behaviour had improved and the noise level in the classroom had dropped.

We’ve made great strides – we have a pod of fifteen laptops for use in our Year 7 and 8 class and a projector, we are getting five more laptops and a printer as well as my own laptop – we are all wireless. We have used it extensively. It is just amazing to see how your skills and the children’s skills just improve. They have done statistics using Excel, PowerPoint presentations, word processing, digital story telling, taking photos with the digital camera and putting pictures into their stories, webquests, lots of graphics, Inspiration use for brainstorming. They email experts in other fields to get information and they email their homework to me. We email our results to the office and teachers email each other – you then have a record of what you have said to each other and can go back and refer to the conversation. They use the Internet for research all the time. What has been most amazing has been the difference in the children – how engaged they are, motivated, quiet and interested. It is visual, interactive and they can actually see what is happening. They can show each other what they are doing and they aspire to be the best in the class. That has been a very good change in a very short space of time. (2006 focus group comment - digital classroom teacher)

5. SUPPORTS FOR TEACHER LAPTOP USE

The contextual factors that shape and frame the opportunities and incentives teachers have to make successful use of their laptops relate to the nature of school leadership and organisational support for ICT use, professional learning opportunities and support for peer mentoring, access to the school technological infrastructure, and national policy supporting the use of ICT in schools.

5.1 SUPPORTS FOR TEACHER USE OF LAPTOPS

Within the school environment, the evaluation looked at the influences of leadership, technological infrastructure and professional development opportunities as factors that might influence teachers' use of laptops.

5.1.1. The influence of school leadership and support

'School leadership' includes the principal, the deputy or assistant principal(s), syndicate leaders and senior teachers, and the ICT lead teacher. Table 14 shows that there were differences between school types as to the various school leaders who were found to be very supportive in helping teachers to use their laptops effectively as a teaching tool.

Table 14 Very supportive leaders in schools (2004-2006)

	Full primary			Intermediate		
	2004 (n=34) %	2005 (n=53) %	2006 (n=78) %	2004 (n=134) %	2005 (n=99) %	2006 (n=64) %
Principal	38	34	28	10	20	25
Deputy principal	18	17	17	23	20	9
Syndicate leader/senior teacher	12	11	14	17	17	16
ICT lead teacher	29	32	42	73	65	72

For the first two years in full primary schools, it was the principal who was most likely to be 'very supportive'. In 2006 a higher proportion of teachers found the ICT lead teacher to be very supportive. In intermediate schools the ICT lead teacher was considered to be very supportive by over two thirds of teachers in all three years. The principal was seen to be very supportive by more intermediate teachers in 2006 than in other years, but it needs to be noted that the number of intermediate school teachers responding to the study decreased from 134 to 64. Somewhat surprisingly, only around a sixth of teachers from both full primary and intermediate schools rated their syndicate teacher or senior teacher as very supportive, suggesting that teachers did not necessarily rely on the support of the leader they were likely to have the most contact with.

The potential that an object draws from the environment, and the possibilities that the user can generate from using that object is a notion that seems to be relevant when examining the ways school leaders might influence teacher use of laptops. In 2005, some 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. Table 15 compares schools

where there was an acknowledged expectation for laptop use with those where there was not [teachers were able to respond to more than one category]. Overall, a higher proportion of teachers felt that school leaders were ‘very supportive’ in schools with expectations for laptop use.

Table 15 Leadership and expectation for laptop use (2006)

	Principal very supportive %	Deputy principal Very supportive %	Syndicate leader/senior teacher very supportive %	ICT lead teacher Very supportive %
Expectation for laptop use (n=98)	26	16	19	56
No expectation for laptop use (n=33)	10	2	1	17
Unaware of expectation for laptop use (n=18)	3	2	3	11

Two thirds (98-66%) of Year 7 and 8 teachers in 2006 reported that their schools had expectations for their use of laptops - in many cases there were several expectations. Administrative tasks were predominant, with use for planning and lesson preparation, communication, use in the classroom, and security measures also listed as school expectations. A higher proportion of teachers in schools where there was an expectation for laptop use (82%) had access to the school network from their classrooms, than in schools where there was no expectation for laptop use (79%), and were more likely to use their laptops more than once a day (expectation-82%: no expectation-59%), and for more than eleven hours per week (expectation-46%: no expectation-27%). Year 7 and 8 teachers in schools where there was an expectation for laptop use were more likely to have received formal professional development in the use of the laptop; however, teachers in intermediate schools were more likely to have received formal professional development than teachers in full primary schools, regardless of whether the school had an expectation for use or not. An involvement in an ICT PD⁶ cluster group did not necessarily mean that teachers were aware of school expectations for laptop use, and professional development from this source was less likely for teachers in intermediate schools.

Focus group teachers felt that leadership and the school culture were important influences on their use of laptops – those who had an ICT lead teacher commented particularly on the excellent direction and support given. Where school leaders had set an expectation for laptop use for administrative tasks such as reporting, teachers had gradually realised the value of digital reporting.

It was up to teachers whether they went the digital way and most of them have, because once they started to see the digital reports, that phased in over the last three years, they liked them and wanted to do them this way. (2006 focus group comment)

Having the student management system on the laptops had been the catalyst for change in one school. Everybody was now expected to use their laptops to access and input data. Working at home on the laptop was a choice that teachers made and there was some discussion about how this choice might become an expectation in the future. However, teachers decided that such an expectation would not really result from

⁶ Since 1999, the Ministry of Education has funded ICT professional development in schools through an ICT PD Cluster Programme. By March 2004, approximately half of New Zealand schools were, or had been, involved in this programme (Ham, 2005).

the impact of laptops, but would be more of a leadership decision about how teachers in a school should work.

One of the frustrations for a few focus group teachers was that some school leaders were reluctant laptop users and did not support the move to electronic systems. One teacher explained how teachers in her school worked in teams, and how she liked to have everything on the laptop, but that the lead teachers wanted folders with paper in them. She said she felt as if she was doubling her workload. It was acknowledged by other teachers that there were some teachers in most schools that were reluctant laptop users and that they could not be forced to 'move'.

5.1.2. The value of professional development/collaborative learning

Three fifths of Year 7 and 8 teachers (61%) had received formal laptop-based professional development in 2006 (2004-72%: 2005-58%), with just 19% as part of an ICT PD cluster. Teachers were asked to indicate what the focus of any laptop-based professional development (PD) they had undertaken was, and Table 16 shows the proportion of teachers in each ability group undertaking the different programmes.

Table 16 Formal laptop-based professional development undertaken (2006)

	Total (%)	Expert users (%)	Intermediate users (%)	Beginners (%)
	2006 (n=149)	2006 (n=36)	2006 (n=103)	2006 (n=10)
How to use the school network	34	25	36	50
Specifics of software program	31	28	31	40
Use for administration	30	31	27	50
Beginning computer skills	28	14	31	50
Support/ideas for classroom use	26	33	24	10
Value of using laptop in teaching	15	11	17	10
Developing resources	12	17	12	0

Bearing in mind that there were very few beginners at the Year 7 and 8 level in 2006, Table 16 shows that beginners were the most actively involved in formal laptop-based professional development in terms of the proportion of teachers, in the areas of administration, use of the network, software and beginning computer skills. This could be explained by the fact that most teachers have had their laptops for three years and were now familiar with these tasks. The tasks involving laptop use in the classroom were the focus of the professional development undertaken more frequently by intermediate and expert laptop users. These tasks included support and ideas for classroom use, and the value of using the laptop in teaching and developing resources. Overall, however, figures indicate low levels of involvement and presumably provision of formal professional development opportunities.

Changes in focus of professional development

Data show that the use of the laptop as a tool for teaching had begun to be more of a focus than it had been in the previous years, as can be seen in Table 17.

Table 17 Formal laptop-based professional development (2004-2006)

	2004 (n=175) %	2005 (n=153) %	2006 (n=149) %
How to use the school network	42	39	34
Specifics of software program	27	36	31
Use for administration	32	29	30
Beginning computer skills	30	26	28
Support/ideas for classroom use	18	21	26
Value of using laptop in teaching	0	0	15
Developing resources	12	10	12

In the first year the greater proportion of teachers were involved in professional development on using the school network, the use of laptops for administration, and beginning computer skills. By 2006, the proportion of teachers undertaking training in the use of the network, and use with specific software had decreased somewhat. Development in the use for administration and beginning computer skills remained around 30%.

Useful aspects of laptop-based professional development

Questionnaire respondents described what they had found useful about any laptop-based professional development they had received. There were 48 comments about the usefulness of professional development. Many of these (18) outlined the skills that had been learnt and the increased confidence that resulted. Professional development that was specific to ideas for teaching was found to be useful by ten teachers.

Using specific programs, such as iMovie, iTunes, GarageBand, PowerPoint and how to implement these into my classroom and make them user friendly for my students. (2006 comment)

Sixteen teachers described aspects of courses that they had found to be helpful, eight of these reported that professional development 'relevant to my own needs' and/or in groups of same-ability users was useful. Two teachers had found professional development they had undertaken was not suited to their needs.

Collaborative learning

In response to a question on who had been very supportive in helping to use the laptop effectively as a teaching tool, 57% of questionnaire respondents said that other teachers in the school were very supportive. Sharing ideas with other staff members was mentioned positively by focus group teachers.

Because teachers have had a laptop they have had to go to someone else and say, "How do you do it?" and it is not a big failure thing, it's how we all learn together. (2006 focus group comment)

Having an 'expert' user on the staff who was able to fix problems and teach others was an important factor in teachers' professional learning; however, teachers had begun to realise that expertise moved when people moved.

The [ICT lead] teacher who takes the Classroom Release Time does everything on his laptop, takes notes and shows teachers what they can do – shows them how to do something and they can go away and practice. He also researches good sites to take our kids on. He knows about our network and server as

well so can maintain things in the school. He is there for three days a week. If there's a problem with a laptop he will take it home and have a look at it. (Year 7&8 focus group teacher)

Focus group teachers involved in an ICT PD cluster also said that the ICT PD contract had been invaluable. Teachers in the focus groups felt although laptops had, perhaps, unintentionally, kick-started ICT professional development, the gap was widening between teachers with laptops and teachers who did not have a laptop. They discussed what they believed the 'blocks' to laptop use to be, such as when a reluctant teacher wanted to learn the basics at an external course, and such a course could not be found. There were still teachers coming into schools with little ICT expertise so there was a continuing need for 'basic skills' training.

5.1.3 The influence of school ICT technological infrastructure and support

In 2006, around three fifths (58%) of teachers selected school networking and school connections, and prompt technical assistance as being 'very important' influences on their use of laptops for teaching and learning.

The school's ICT technological infrastructure, especially the easy classroom access to the school network, the Internet and to other equipment, in particular, a data projector, was considered to be the main influence on the use of the laptops in the classroom by focus group teachers. It was clear that those who had access to the cabling, the school network and additional equipment were making the most use of their laptops for classroom use. Over the three-year period, teachers had become familiar with laptop uses for administration and communication, and were now concerned with the possibilities for use in the classroom. Focus group teachers reported that setting up a school network and testing it out seemed to take a long time – up to 18 months in one case, and could be very frustrating. However, once it was up and running, using the laptop to access and use the school network meant that teachers were experiencing efficiencies. Focus group teachers in small schools were concerned that when a person on staff, who had been very supportive to other teachers with laptops in a technical sense left, there was a 'big gap' and the school suffered. It was felt that this was not so important in a bigger school. These findings informed the questions and then confirmed the analysis of the questionnaire responses, now discussed:

Access to the Internet, to the school network, and wireless capability

In 2006, around 60% of the 149 Year 7 and 8 teachers spoke about using their laptops with individual students, small groups of students, with the whole class or the whole school. Information from both focus groups and questionnaire responses indicated that Year 7 and 8 teachers used their laptops in lessons in varied ways. Much of this use was dependant on classroom access to the Internet. Over the three-year period there had been a steady increase in the proportion of teachers who could access the Internet in their classroom. From 2004 to 2006, almost all teachers taught in schools where there was internet access, and internet access in the classroom was available to 124-83% of Year 7 and 8 teachers by 2006 (see Table 18).

Table 18 Internet access in schools (2004-2006)

	2004 (n=175) %	2005 (n=153) %	2006 (n=140) %
Internet access in school	99	94	98
Classroom access	66	70	83
Staff work area access	54	83	87
Library/information centre access	43	57	73

Teachers appreciated the increased access to the school network (see Table 4) and to the Internet from most areas of schools over the three-year period. When asked in 2006, only a quarter (26%) of Year 7 and 8 teachers reported wireless capable areas in their schools, with substantially greater wireless capability being reported from teachers in full primary schools.

Access to additional equipment

To maximise the efficiency of their use of laptops as a teaching tool, teachers need easy access to additional equipment. There was an increase in easy access to additional equipment available to teachers over the three-year period, with around three quarters of teachers reporting easy access to digital cameras, printers, and data projectors. In 2006, almost half (42%) of teachers said they would like access to an interactive whiteboard.

Technical support

There was an increase in the proportion of teachers reporting technical support over the three-year period. The support of colleagues remained the most frequent response (2004-69%; 2005-67%; 2006-73%). There had been a substantial increase in the proportion of teachers reporting the support of an ICT lead teacher or computer committee (2004-49%; 2005-47%; 2006-70%), and a full-time or part-time technician (2004-39%; 2005-38%; 2006-50%). Help from an outside expert remained relatively constant (2004-33%; 2005-37%; 2006-38%). Focus group teachers discussed the role of the 'outside expert' who played a crucial role in small schools where there was no in-school expertise.

6. SUSTAINING CHANGES IN TEACHER LAPTOP USE

Based on previous years' findings on the kind of support teachers felt was necessary for them to use their laptops effectively in their teaching, the 2006 questionnaire listed a number of factors that may have influenced teachers in their use of laptops in the classroom. 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. Table 19 shows the proportion of teachers who regarded each factor as 'very important'.

Table 19 Very important influences on teachers' laptop use in the classroom (2006)

	Count	Percent
School networking	101	68
Prompt technical assistance	87	58
Time to experiment	77	52
Easy access to equipment	69	46
PD/support	61	41
Leadership support	61	41
Collaborative culture	47	32

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. Around three fifths (68%) of teachers selected school networking and school connections, and prompt technical assistance. Time to experiment and practice with use of the laptop for teaching was considered to be very important for around half (52%) of the 2006 questionnaire respondents.

When teachers were then asked to indicate the 'most important' influence from this list of seven factors over a quarter (27%) chose 'time to experiment and practice with use of the laptop for teaching' as being the most important factor. Just under a fifth selected easy access to equipment (18%), and professional development and support (17%) as the most important influence on their use of the laptop. Taking 'time' and 'professional development and support' together, means that almost half (44%) selected factors associated with their having time and opportunity to learn more as the most important influence on their laptop use.

Table 20 Most important influences on teachers' use of laptops in the classroom (2006)

	Total (n=149) %	Expert (n=36) %	Intermediate (n=103) %	Beginner (n=10) %
Time to experiment	27	25	26	40
Access to equipment	18	36	13	10
PD/support	17	6	21	10
Technical assistance	15	14	17	0
School connections	13	11	13	20
Leadership support	3	3	3	0
Collaborative culture	3	6	3	0

Looking across the factors, as shown in Table 20, those who rated themselves as expert users identified 'access to equipment' (36% - 18% overall) as the most important influence in a greater proportion than the norm and either beginners or intermediate users. Just over three-fifths identified technological infrastructure issues as the most important influence on their laptop use.

Intermediate users were more likely to rate support related needs. Nearly half of those who rated themselves as intermediate users or beginners identified professional learning needs (time and professional development) as the most important.

A higher proportion of beginners selected 'time to experiment' (40% - 27% overall) and 'school connections' (20% - 13% overall), suggesting that they were aware of their own knowledge and expertise as a limit on their laptop use as well as the necessity of having good school connections. Perhaps this was because accessing the Internet and emailing tended to be the first tasks that beginners became comfortable and confident with.

The findings indicate that over a third of the teachers rated each of the listed factors as 'very important' (and around a fifth of teachers considered each to be 'quite important') suggesting it is not sufficient to consider professional development, available ICT infrastructure, resources and support, and teacher confidence and expertise in isolation. It is the convergence of teacher confidence and expertise, the professional development they receive, as well as access to reliable ICT resources that supports the integration of the laptops into teachers' professional lives. It is these factors in combination that support and sustain, and or inhibit teacher use of laptops/ICT. Individually and in combination they are manifest as enablers and constraints in different ways in different school settings and in different forms at different stages in teacher and school integration of the use of laptops/ICT.

7. WHERE TO NEXT: FUTURE REALITIES

To sustain and accelerate the growth that Year 7 and 8 teachers have made over the three-year period it is essential that the TELA scheme maintains momentum. The area of immediate concern identified in this evaluation is the need for professional learning opportunities with a focus on the pedagogies that would enable the best use of laptops/ICT at the Year 7 and 8 level. Across the three years of the evaluation the most prevalent ‘main’ area for development for teacher use of the laptop was to ‘learn about ICT as a tool in teaching’. The main areas selected in 2006 are compared with responses from 2004 and 2005 in Table 21.

Table 21 Teachers’ goals for using their laptops in their teaching role (2004-2006)

	2004 (n=167) %	2005 (n=124) %	2006 (n=143) %
Learn about ICT as a tool in teaching	37	45	46
Learn to use/improve skills	23	15	15
Create teaching/learning resources	14	14	19
Access student records/admin tasks	11	11	6
Use specific software programs	9	6	5
Create websites	3	8	4
Access assessment resources	3	1	5

Over the period of three years tasks associated with teaching were selected by over half of teachers overall as their main goal for future development. In 2006, 60% of respondents identified this set of tasks as the goal for development. The proportion of questionnaire respondents focusing on skill-related tasks dropped from around a third (35%) to just under a quarter (24%). The proportion focusing specifically on learning to use and improve skills fell from 23% to 15% from 2004 to 2005, this maintained in 2006.

Given that TELA teachers remain quite focused in their desire to learn more about the potential of the laptop to help them in their classroom teaching it would seem appropriate that professional learning opportunities include an emphasis on student-centred pedagogies and pathways to pedagogical change.

The main area for development of the laptop each year was to learn about ICT as a tool in teaching. The goals in the focus groups were also mainly related to use in the classroom as a tool for teaching and learning but also focused on the support needed to achieve this main goal, this including time for self-directed professional development and release time for helping reluctant laptop users, and improved technological infrastructure.

To sum up, the examples of teacher laptop use in this report are merely small glimpses of ongoing activities. Nevertheless, they show an important development in school-based learning. They illustrate that there have been changes within the learning environments in Year 7 and 8 classrooms as a consequence of teachers having TELA laptops. They also show how the teacher’s laptop can change the learning environment towards more flexibility and greater connection to the world outside the classroom. Teachers generally agreed that a major impact of their use of the laptops on student learning was increased pupil motivation and

increased availability of information to pupils. Teacher commentary indicated that many were creating and tailoring teaching and learning resources that met the learning needs of students and that students were engaging creatively with these resources. There was also evidence that the laptop has afforded students with a way to take responsibility for their own learning as they carry out tasks on their own or in a group, create a website, work on authentic problems, publish their work for others to read, and collaborate using the laptop. In this way the laptops can be seen to have helped teachers to cope with the complexity of learning needs in their classrooms that Alton-Lee (2003) suggests is the central challenge for teachers. Teachers using laptops were increasingly making connections, providing multiple opportunities to learn, facilitating shared learning, enhancing the relevance of new learning and creating a supportive learning environment for their students, as the new draft curriculum (Ministry of Education, 2006b) requires.

Teachers were becoming more effective and efficient by using customised tools to aid their lesson planning and preparation, and administrative tasks. They were using group-learning opportunities that recognised individual differences and they were giving students opportunities to learn outside the classroom. TELA laptops have helped teachers to begin to integrate ICT effectively into their teaching practice. Teachers wanted to use laptops more in their teaching role and believed they needed more time and professional development, along with reliable school connections and easy access to peripherals.

8. 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 laptop teachers' integration of ICT into their professional lives. The findings suggest that sustained growth in teachers' use of laptops, especially for teaching and learning, requires a systems solution to build capacity. Fullan (2005) describes capacity building as developing the collective power of a group to bring about positive change. This development will encompass new skills and dispositions, enhanced and focused resources, and new and focused motivation or commitment. The findings of this study lend support to the contention that any analysis of the impact of ICT cannot afford to decontextualise it from the factors that shape the larger context of schools - a systems analysis is required (Selwyn, 2002). Systems change is accomplished through the conscious, deliberate, reflective actions of individuals and groups at all levels of the education sector. Hence, we set out implications for national educational policymakers, schools leaders, and teachers.

8.1 NATIONAL POLICY

The provisions of the TELA scheme can be seen to influence the context for teacher use of ICT in general, and their use of the laptop computer in particular. The provision of a portable laptop computer for teachers' personal use provided for a flexibility in time and place of use that teachers very much appreciated. The ability to store all their professional work in one place and to easily access information, people and services brought efficiencies and motivated teachers to learn more about using ICT in their teaching role. Under the TELA scheme (Ministry of Education, 2004), the government reimbursed two thirds of the lease cost on approved laptops for use by eligible teachers. The teacher and/or the school were required to meet the balance of the lease cost. Teachers were asked whether they or the school were paying the one-third lease costs. In 2006, a majority of teachers reported that their schools paid all the lease costs (2004-68%: 2005-80%: 2006-84%). In this way, schools can be seen to have actively engaged with the scheme as a means to enhance ICT use. The TELA policy thus can be seen to have provided a direction and resources for change.

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

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, 2006a). Teachers wanted to learn more about the use of ICT in teaching and learning and they said they needed more time to experiment and to learn to use new technologies. The importance of 'time' and 'professional development and support' as the major influence on their use of laptops in the classroom was more so for 'beginners'.

We recommend that:

1. Policymakers adopt a systems approach to the development of policy and practices to initiate, extend and sustain the integration of the laptops/ICT into school and teacher work, particularly in relation to teaching and learning.

2. Ongoing support be given for schools to collaborate to share knowledge and expertise in ICT use, particularly use for teaching and learning. Schools be supported and encouraged to provide opportunities for on-site 'experts' to continue to extend their expertise including their expertise in mentoring and working with colleagues.
3. The focus for future professional development be on how teachers might use the laptop for teaching and learning, and on the use of the laptop with other equipment, with a focus on pedagogy.
4. A mechanism be put in place to ensure that schools have access to advice and guidance about infrastructure development, including the resources and systems needed to operationalise their vision.
5. A mechanism be put in place to ensure that schools have quality access to technical support - consideration be given to funding onsite school technical positions.

8.2 SCHOOLS

School leaders also need to adopt a 'systems approach' that includes professional development opportunities, technical infrastructure support and leadership in the use of laptops/ICT in the school.

Professional learning opportunities

The evaluation study has shown that there is potential for TELA laptops to expand possibilities for learning and to influence teaching practices. It has been a slow process of getting used to new technology and with support and encouragement, often from colleagues; laptop use has begun to expand the possibilities for learning activities in Years 7 and 8. It was evident from the findings that by 2006 laptops had begun to influence teaching practices indirectly, and teachers' images of their own work had begun to evolve to take technology into account. This does not mean that it is enough for a teacher to have use of a TELA laptop for pedagogical change to occur, the use of technology may serve only to fit into current practices. A focus for development could be the understanding and development of new kinds of relationships between learning and teaching and the technology.

We recommend that:

1. School leaders be encouraged and supported to adopt a systems approach to the development of policy and practices to initiate, extend and sustain the integration of the laptops/ICT into school and teacher work, particularly in relation to teaching and learning.
2. 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, with a focus on pedagogy.
3. Schools consider how best to support and utilise peer mentoring which can provide for teacher professional learning that is relevant and timely.

4. Boards of Trustees and school management teams provide opportunities for school or syndicate leaders to learn more about how to provide professional development for staff with laptops.
5. The provision of professional development opportunities for all teachers with laptops be coordinated by an individual in the school who has the role of ICT professional development facilitator, and who is supported to help teachers to work in a sustained way with colleagues. This role could also be undertaken by a dedicated group.

Development of school technological infrastructure

We recommend that:

1. Schools continue to upgrade their infrastructure, in particular, at this time, the availability of additional equipment and ongoing technical support.
2. Schools' technological infrastructure improvement programmes be seen as ongoing as teachers are keen to take advantage of new tools as they are developed.

School leadership

We recommend that:

1. School leaders encourage all their teachers to participate in the TELA scheme as a means to promote whole school focus on and development of ICT use.
2. Where practical and possible, school leaders model use of the laptop/ICT for administrative and management tasks and communication.
3. School leaders seek out opportunities to learn more about the possibilities of ICT use across all aspects of school life.
4. School leaders give consideration to setting realistic and achievable expectations for teachers' laptop use.
5. School leaders make provision for teachers to work together to develop and share ideas and activities for teaching and learning by providing teachers with opportunities to share expertise.

8.3 TEACHERS

The findings indicate that access to a TELA laptop resulted in Year 7 and 8 teachers gaining more confidence and capability in the use of ICT. By 2006, they were making use of the laptops for communication with colleagues, a range of administrative tasks including reporting to parents, and the development of classroom materials. 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 development was heavily influenced by internal factors in a school, such as help from colleagues. Easy access to models for teaching students using ICT would seem to be essential. This situation also has the additional benefit of supporting the development of schools as learning communities. Given the evolutionary nature of ICT and its possible uses it seems likely that opportunities to share will continue to be important. Teacher commentary indicated that the facility to use the laptops/ICT for communication and collaboration, and for accessing material, information, and services via the Internet, was becoming more common, to the extent that those without the requisite expertise were likely to be excluded from the broad range of these activities.

We recommend that:

1. Teachers take advantage of what opportunities they have to access professional development on the potential of ICT, particularly the role of laptops in teaching and learning.
2. 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 level.
3. Teachers who are proficient laptop users pool and share their expertise.

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APPENDIX A: EVALUATION TIMETABLE

01 May 2004 – 30 November 2004

Meet with Ministry of Education (October)

Develop and carry out Y7&8 focus groups (x2)

Develop, administer, and analyse baseline Y7&8 questionnaire

30 November 2004 – Research Report One – results focus groups (1), questionnaire (1)

01 December 2004 – 30 April 2005

Meet with Ministry of Education (April)

Undertake Y7&8 focus groups (phase 2)

30 April 2005 – Research Report Two – results focus groups (2)

01 May 2005 – 30 November 2005

Develop, administer and analyse second Y7&8 questionnaire

Meet with Ministry of Education (October)

30 November 2005 – Research Report Three – results questionnaire (2)

01 December 2005 – 30 April 2006

Meet with Ministry of Education (April)

Undertake Y7&8 focus groups (phase 3)

01 May 2006 – 30 November 2006

Meet with Ministry of Education (July)

Develop, administer and analyse third Y7&8 questionnaire

30 November 2006 – Research Report Four – results focus groups (3), questionnaire (3)

28 February 2007 – Final report Y7&8

Evaluation reports

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