Outcomes for Teachers & Students in the ICT PD School Clusters Programme

2005-2007—A National Overview

Report to the Ministry of Education

V. Ham
CORE Education Ltd

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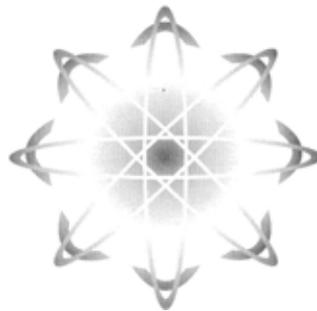
A report to the New Zealand Ministry of Education

Vince Ham

technology | innovation
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Final Report to the Ministry of Education on the ICT PD School
Cluster Programme 2005-2007.

Submitted by CORE Education Ltd.

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Executive Summary

Background

This report is submitted to the Ministry of Education as part of an ongoing evaluation of the Information and Communication Technologies Professional Development (ICT PD) teacher professional development initiative, which has been implemented in New Zealand since 1999. The focus of this particular report is on the effectiveness of the 2005-2007 cohort of ICT PD School Clusters programmes and as such supplements previous evaluations of the first five ICT PD School Clusters Programmes submitted to the Ministry in 2002, 2004, 2005, 2006 and 2007.

As outlined in the performance agreements between the Ministry and the ICT PD clusters, the ICT PD School Cluster programmes in New Zealand are aimed at increasing teachers' ICT confidence, skills and pedagogical understandings of ICTs, fostering quality learning communities, and increasing the frequency and quality of the integration of ICTs to support effective classroom teaching and learning. The research reported here takes these performance criteria as its starting point to provide a national overview of the programme's impact on teachers, teaching and classroom learning in New Zealand, by means of an analysis of the results of the End of Project surveys of c.1250 participating teachers.

Findings

The overall finding of the study is that the 2005-2007 ICT PD programme had a marked and significant effect on the teachers and students in cluster schools with respect to all of its key goals. There were very high levels of goal achievement reported by participants, and marked increases or changes with respect to all of the relevant Ministry's objectives as outlined in cluster performance agreements. At the national level, the programme achieved its overall goals of: significantly increasing teachers' skills and confidence with ICTs, improving teachers' understandings of the role of ICTs in teaching and learning, and providing quality ICT-mediated learning experiences for students. The programme for the 2005-2007 cohort increased teachers' ICT skills, confidence and understandings about ICTs, and significantly increased routine student use of a range of ICTs for learning in classes. The 2005-2007 programme achieved levels of participant satisfaction that, though high, were somewhat lower than the preceding (2004-2006) cohort, and achieved overall increases in skills, confidence, understanding and classroom/student usage of ICTs for learning in orders of magnitude at least similar to those of earlier cohorts.

We note also that overall the ICT PD programme continues to have a significantly greater impact among primary teachers and schools than among their secondary counterparts.

Specifically, we found that:
- The great majority of teachers expressed high levels of satisfaction and goal achievement at the end of the programme. Participant satisfaction, while high across the board, varied somewhat by sector and length of time in the programme, with primary teachers and those who had been in the PD programme for most of the 3 years stating higher levels of satisfaction and goal achievement than secondary teachers and those who were in the programme for only a few months or up to a year.

- The programmes were seen by the majority (66%) of participants as having been a 'significant' event in their overall development as teachers, which for many contributed well beyond any ICT-specific issues of increased technical skill, to encompass improved understandings in relation to teaching and learning more generally.

- Teachers generally appreciated all of the ways the programmes were delivered and the knowledge and expertise of particular facilitators. The content of the programmes, being for most programmes a mix of skills development, classroom ideas and principles of effective teaching and learning generally, was seen by more teachers than not as relevant and effective. Prominent among the most appreciated aspects of the programmes, were the various opportunities provided to share ideas and problems and reflect together on their use of ICTs, both within clusters and through the various regional and national conferences, suggesting that a learning community focused on critical reflection of classroom ICT practice is continuing to develop both regionally and nationally.

- At the end of the programme the greatest persisting concerns for teachers with regard to their use of ICTs were a lack of student access to equipment, a perceived lack of time to keep up to date, and technical reliability, and some concern about the continuing need for PD to continue after the programme's formal end point.

- There was a marked and significant increase in teachers' ICT skills over the period of the programme. Teachers' reported skill levels on entry to the programme were generally moderate to high already, though somewhat variable across different ICTs. By the end of the programme the great majority of teachers reported moderate or high skill levels across the whole range of educationally useful ICTs measured.

- There was also a marked and significant increase in teachers' confidence about their professional use of ICTs over the period of the programme, both in terms of their confidence as personal users and in relation to students using ICTs in their classes. Teachers reported that on entry the great majority of them had been either 'anxious', 'not confident' or 'neutral' about their professional use of ICTs, female and primary teachers being less confident than male and secondary teachers. By the end of the programme over three quarters of all the demographic groups studied were reporting moderate or even high levels of such confidence. Moreover, the longer teachers were in the programme, the greater was the extent of their gain in confidence. Throughout the programme levels of confidence as personal users remained higher than those related to classroom use of ICTs.

- The effect of the ICT PD programme on teachers' classroom practices was variable from teacher to teacher and from school to school, but substantial overall. Over a third of teachers acknowledged that over the programme period their classroom practices had changed to 'a large extent' or 'completely', while 86% felt their practices had changed at least to some extent. Female and primary teachers reported greater change in this regard than male or secondary teachers.

- Participants reported that on entry to the programme , they were already generally positive about the value of using ICTs for teaching and learning. At the end of the programme they showed a similarly positive disposition towards the value of ICTs in the teaching and learning process, but many stated that they now had a clearer conception of how its educational value might be judged.

  - The most frequently reported effects of using ICTs with classes on their *practice* included: teaching with increased confidence and enthusiasm, expanding their repertoire of teaching techniques, using

a wider range of activities, and catering for a greater range of student need across a broader range of curriculum objectives.

- The most prominent effects of the programme in terms of developing teacher *understandings* about learning were expressed as: a better understanding of student-centred teaching and learning, getting new ideas about establishing a resource-rich learning environment, increased knowledge of teaching and learning theories, styles and approaches, challenging pedagogical perspectives through sharing and discussion.

• There was a marked and significant increase in teachers' use of ICTs with their classes as a result of the programme. Two thirds of teachers had either never used ICTs with classes prior to the programme, or had only used them once or twice a year. By the final year of the programme three quarters of participating teachers reported that their students were using ICTs on a routine basis (i.e.: in most or all units of work over the year).

• Primary teachers reported using ICTs in a greater proportion of their units of work than secondary teachers. The other significant predictors of increased classroom usage of ICTs by teachers in the clusters were their rising levels of confidence with and about the technology, and the length of time they were actively engaged in the PD programme.

• The surveys provide some proxy evidence of the conscious alignment of ICT-based classroom activities to identified student learning outcomes.

- Teachers tended to report the learning outcomes from student use of ICTs in terms of: increased student-centredness in lessons, increased student motivation, coverage of a wide range of curriculum topics and objectives, student acquisition of ICT skills, and increased opportunity for learning activities which promoted communications skills, enquiry skills, high order thinking, creativity and a range of social skills.

- There were no statistically significant sector differences in relation to increased student use of ICTs for higher order thinking and critical thinking skills, but primary students were more likely to engage in frequent use of ICTs with classes than secondary students for all of: creative activity, curriculum content acquisition, information gathering or processing, collaborative learning, motivation and technical skill acquisition.

- The largest proportion of ICT-based student activities reported by teachers related to the Languages Essential Learning Area (26%), followed by Mathematics (15%), Science (13%), Social Studies (12%).

• In most respects the effects and trends listed above for the 2005-7 ICT PD national cohort are similar in both nature and magnitude to those reported for the earlier cluster cohorts. In general, the same effects, of a similar size, have been identified in all cohorts. The only notable exceptions or differences between the 2005-7 cohort and earlier cohorts in terms of programme effect or effect size were:

- The skill levels of teachers in the 2005-7 cohort on entering the programme, and also on exiting it, were generally higher than those of the earliest cohorts but similar to those reported for the 2003-5 and 2004-6 cohorts that immediately preceded it. Skill levels, both on entry and exit, as well as

programme impacts on skills, are 'flattening off' as successive cohorts begin and finish their programme with higher skill levels across the range of ICTs used in education.

• There were some cohort differences in terms of the learning outcomes of ICT use by students in the 2003-5 and 2004-6 cohorts compared to earlier cohorts. There is a clear tendency for students in the 2005-7 cohorts to show higher frequencies of use of ICTs than previous cohorts with respect to all of: static presentation (mostly word processing and slide shows), problem solving activities (mostly through spreadsheet use), information processing activities (mostly through Internet use), online communication (email, social software), and curriculum practice activities (mostly games, Drill and Practice or interactive/multimedia tutorials).

Finally, we note that levels of goal achievement and meeting of expectations were lower than in the 2004-6 cohort but still much higher than in the 2003-5 cohort, across all of the groups of goals identified.

Introduction

This report is on the effectiveness of the 2005-2007 cohort of ICT PD School Clusters and supplements previous evaluations of the first five ICT PD School Clusters Programmes submitted to the Ministry in 2002, 2004, 2005, 2006 and 2007.

The report is submitted to the Ministry of Education as part of an ongoing evaluation of the Information and Communication Technologies Professional Development (ICT PD) teacher professional development initiative. The ICT PD initiative was first announced in the strategy document *Interactive Education: An Information and Communication Technologies Strategy for Schools* (Ministry of Education, 1998), and has been a feature of subsequent policy implementations as outlined in *Digital Horizons: Learning Through ICT: A Strategy for Schools* (Ministry of Education, 2001, Revised 2003), and more recently in *Enabling the 21ˢᵗ Century Learner: An e-Learning Action Plan for Schools 2006-2010 (Ministry of Education 2006)*. It is the latter of these documents (*The e-Learning Action Plan*) that most directly provides the policy background for the implementation of the particular ICT PD cluster programme that is the subject of this report – the '2005-2007 cohort'.

It should be noted that ICT PD cohorts operate their programmes in cluster schools over a period of three years, and that the contents of the report speak specifically to the effectiveness of the professional development programmes over the full three-year period from 2005-2007. The final section in the report compares the results for this cohort with those of previous cohorts and comments on the respects in which national outcome trends in the overall ICT PD initiative since 1999 have, or have not, been maintained over time.

As outlined in the performance agreements between the Ministry and the ICT PD clusters, the ICT PD School Cluster programmes in New Zealand are aimed at increasing teachers' ICT confidence, skills and pedagogical understandings of ICTs, fostering quality learning communities, and increasing the frequency and quality of the integration of ICTs to facilitate improvements in students' learning, engagement and achievement.

The research reported here takes these performance criteria as its starting point to provide a national overview of the programme's impact on teachers, teaching and classroom learning, by means of an analysis of the results of a post-hoc survey of c.1250 participating teachers.

The 2005-2007 ICT PD School Clusters Programme in the National Strategy for ICT in Schools

In 1998 a national 'ICT Strategy for Schools' was announced which established a new, 'national' system of funded professional development school clusters. This programme has become known as the ICT PD School Clusters programme. The main features of the cluster programme, which has become an ongoing feature of the teacher professional development landscape in New Zealand since 1999, are:

- The bulk of the programme funding is devolved directly to schools as both 'producers and consumers' of their own PD programmes.

- The programmes are only available to *groups* of schools, which have committed to a 'clustered' model of professional development for the benefit of teachers in all the participating schools.

- The programmes are funded over three years, for programmes that are to last for three years.

- No particular delivery model is mandated. Within very broad parameters, applicants for ICT PD cluster funds are expected to develop and propose their own models of delivery, rather than to implement a predetermined, Ministry-approved, model.

- There is central coordination of the programmes through the Ministry of Education itself and a team of contracted National Facilitators who provide professional development support, advice and coordination to the clusters as a national community.

The basic framework of the ICT PD cluster programmes is centrally prescribed. The programmes are to focus on the integration of ICTs into a variety of teachers' professional practices. A 'Lead School', often, but not necessarily, one with a reputation for best practice in the area of ICT use, forms a collaborative partnership with other schools for the provision of up to three years of teacher professional development in those schools. Each cluster receives c.$120,000 per annum in central funding. These funds are to be spent on teacher professional development, and may not be used to defray schools' hardware, software or infrastructure costs. Beyond that common brief, however, schools are free to group themselves as they wish, and are encouraged to develop and propose their own models and modes of delivering their programmes.

Early in 1999, 23 such ICT PD School Clusters in various parts of the country were selected as the first cohort under the scheme, finishing their three year round of development in 2001. The government decided to continue the programmes on a rolling basis from 2001 onwards. The cohort which is the subject of this report was thus the sixth intake or 'cohort' of clusters. They began their programmes in January 2005 and completed at the end of 2007. This report on the 2005 cohort of ICT PD cluster teachers thus stands as a separate report on the effectiveness of 2005-2007 programme, but it also supplements and updates reports on previous ICT PD School Cluster Programmes submitted to the Ministry from 2002 to 2007.

Programme goals

The ICT PD School Cluster programmes in New Zealand have been generally aimed at increasing teachers' ICT skills and pedagogical understandings around ICTs, at increasing the frequency and quality of the use of ICTs in schools to support classroom teaching and student learning.

These broad goals were rearticulated as a number of specific performance measures and expected outcomes included in the various cluster cohort contracts. The specific statements of these goals changed during the course of the three years of the programme reported here, although the general tenor of them has remained the same across successive cohorts. The goals formally identified for the 2005 cohort programmes were that:
- Teachers' confidence and skills in using ICTs increase

- Instances of ICT use integrated into pedagogical practice across the curriculum increase

- Teachers improve their understandings of the roles of ICTs in supporting teaching and learning

- Professional learning communities around and through the use of ICTs in schools are fostered and strengthened

- ICTs are used to enable quality learning experiences in classrooms that are focused on student learning, engagement and achievement.

Structure of the Report

The research on the 2005-7 cluster programme provides a national overview of the programme's impact on teachers, teaching and learning in New Zealand, through an analysis of the results of a pre-post survey study of teachers from all clusters. The report begins with an analysis of the relative impacts of the 2005-7 programme over time in terms of the key performance goals of the programme listed. For convenience we group these goals and impacts into three main areas, each of which is reported as a separate section:

- The effects of the PD programmes on **teachers** themselves, as indicated by the reported effects on teacher skills, confidence, and understandings in relation to ICTs in teaching and learning.

- The effects of the PD programmes on **usage of ICTs by students**, as indicated by teacher reported rates of classroom usage, curriculum coverage, and the provision of 'quality learning experiences'.

- The provision of **appropriate advice, PD and support** by the various cluster programmes, as indicated by reported levels of participant satisfaction with the programmes and levels of teacher goal achievement.

Methodology

Research questions

The brief for the research on the 2005-7 cohort of ICT PD clusters was to provide a broad national profile of the impact of the programme across the country as a whole. It has not been our role to evaluate specific clusters or their particular PD models. To this end the core research question being addressed is not so much to identify which particular models of PD are most effective, but rather to conduct a survey-based study to evaluate how well, and in what respects, the national ICT PD School Cluster initiative has been meeting the objectives of stakeholders and participants across the cohort. In doing this we addressed the following core research question:

How effective overall was the 2005-7 ICT PD programme in meeting its goals of:
- increasing teachers' ICT skills, confidence and knowledge related to the educational applications of ICTs, and

- promoting quality classroom learning experiences for students?

Research strategy and data collection

Survey data were gathered from all 20 of the 2005-7 cohort clusters. These comprised responses from both pre- (Baseline) and post- (End of Project) programme surveys of all participants. In order to maximise validity of comparison across cohorts, the Baseline and End of Project instruments were based on the equivalent questionnaires developed for the previous cohorts in the programme and reported separately in previous reports to the Ministry.

Table 1:   Timetable of research surveys in ICT PD cluster cohorts, 1999-2008 (Shaded surveys are those relevant to this report)

	1999	2001	*2002*	2003	2004	*2005*	*2006*	*2007*	*2008*
1999 cohort	BL		EOP						
2001 cohort		BL		EOP					
2002 cohort			BL		EOP				
2003 cohort				BL		EOP			
2004 cohort					BL		EOP		
2005 cohort						**BL**		**EOP**	
2006 cohort							BL:		
2007 cohort								BL	
2008 cohort									BL

Key: BL=Baseline survey; EOP = End of Project survey

The profile of the 2005 cohort *on entry* to the programme, as established by the baseline survey of 2005, along with entry-point comparisons between this and previous cluster cohorts, has been reported separately to the Ministry (Ham *et al.* 2005). This report focusses on the *effects* of the programme evidenced through retrospective self-report data gathered in the End of Project survey (October 2007).

Respondent demographics

Table 2:   Number of responses to 2005-2007 Baseline and End-of-Project surveys, by cluster

Cluster	EoP	Cluster	EoP
AVRACS Cluster - Ardgowan School	51	South Otago Net - Tokomairiro High School	54
Big River Cluster - Clutha Valley School	58	Tai o Rapuwai Cluster - Port Chalmers	54
Heretaunga Futures Cluster - Oxford Crescent School	78	Tapatoru Cluster - Halswell School	78
Kerikeri Schools ICT Cluster - Kerikeri Primary School	29	Te Ihutai Cluster - Redcliffs School	98
Kiri Kiri Mangu Cluster - Parakai School	66	Te Waka Cluster - Kaiapoi North School	35
Nga Tii Roa Cluster - Paengaroa School	44	The Ignition Project - Hillmorton High School	52
Onehunga-Howick Secondary - Onehunga High	102	Waikowhai Cluster - Waikowhai Intermediate	8
Rotorua Secondary ICT Cluster - Rotorua Girls' High	52	Waimea South Cluster - Brightwater School	74
South 3 Cluster - James Hargest High	83	Wanganui Cluster - Wanganui East School	65
South and Rural Wairarapa ICTPD Cluster - Greytown	72	West Auckland Intermediates - Henderson Intermediate	93
		Grand Total	**1246**

In all, 1246 valid End of Project survey responses were received from teachers in the 20 cohort clusters. This represents an estimated response rate of c.60% for the End of Project survey. The End of Project response rate is consistent with response rates for the other 'online' surveys of ICT PD cluster teachers conducted prior to 2007.

It appears that the demographic distribution of the respondent group for the End of Project survey was *dissimilar* to that of the broader teacher population in the ICT PD programmes in terms of gender and in terms of sector. About 75% of respondents were females and 25% were males, which, when broken down by sector represents a ratio of female to male teachers among the primary sector respondents of 78%:22% and in the secondary sector of 65%:34%. Compared to the general gender distribution of teachers in the respective sectors, therefore, *male* teachers were notably underrepresented in the 2005-7 ICT PD cohort and surveys, as they have been in most previous cohorts and surveys.

About 72% of responding teachers taught at primary school level, 27% at secondary, and 1% taught both primary and secondary students. As had been the case for all but one of the previous cohorts, the proportion of primary participants in this ICT PD cohort was significantly larger than that of secondary. In this cohort primary teachers are over represented compared to secondary teachers by margins higher than the two previous cohorts but similar to those in the first three (1999-2001, 2002-4, 2002-5). The 2003-5 cohort

remains the only ICT PD cohort since 1999 in which secondary and primary teachers, *and* males and females, have taken part in similar proportions to those in the general teaching population.

Table 3:   Respondents by school sector (end of project survey, n=1241)

School Sector	Total	%
Primary	892	72%
Secondary	335	27%
Both	14	1%

A strong correlation was evident in studies of previous ICT PD cohorts between the length of time that individual teachers were actively engaged in the programme and their subsequent levels of confidence and classroom usage of ICTs. This may account for the tendency for respondents to have been actively engaged in their programmes for longer rather than shorter lengths of time. In the 2005-7 cohort some 55% of teachers' were actively engaged in the ICT PD programme for more than 2 of the 3 years of the programme. Only 7% of teachers had been in a programme for short-term periods of less than six months (Table 4). Overall these proportions are roughly comparable with those for the two prior cohorts, but higher for the specific proportion taking part for more than 31 of the 36 months.

Table 4:   Respondents by length of time actively involved in the ICT PD programme

Length of active involvement (Months)	Total	Percentage
0-6	83	7%
7-12	167	13%
13-18	113	9%
19-24	195	16%
25-30	122	10%
31-36	552	44%
N	1232	

Effects of the 2005 – 2007 ICT PD Programme on Teachers

The main programme-level goals of the ICT PD school clusters initiative with regard to the effects on teachers themselves were:

- Increased skills among teachers across a range of educationally useful ICTs.

- Increased teacher confidence about their personal use of ICTs and about the use of ICTs with and by students in classes.

- Improved understandings of the roles that ICTs can play in improving classroom teaching and learning.

- Engagement of teachers in critically reflective communities of practice through and about ICTs.

Nationally, there was a clear and significant increase/improvement in relation to all of these indicators over the period of the programme.

Teachers' ICT skills

Over the period of the programme teachers' skills in using ICTs increased significantly, especially, but not exclusively, for those who at the beginning of the programme had rated their skill levels as either very low or non-existent. As can be seen in Table 5, below, there were significant reductions across the board in the proportions of teachers who rated their skills as low or non-existent, and significant increases in the proportion who rated their skill level as high or very high. This was the case even with regard to ICTs such as word processing where the great majority of teachers *entered* the programme already with reasonable pre-existing levels of competence. By the end of the programme very solid majorities of teachers felt they had moderate or high skills with regard to file management (94%), basic computer operation (94%), word processing (98%), Internet (94%) and telecommunications (96%). Lower but still relatively high levels of end of programme competence were reported with regard to graphics (81%), spreadsheets (67%), databases (57%) and multimedia packages (72%), though these still show significant increases compared to entry point proportions. The *increases* in teachers' skill levels during the programme was considerable across all ICTs, but it was most notable in relation to graphics and multimedia applications.

Table 5:   Teachers' skill levels with various ICTs before and after the programme (as reported in the end of project surveys)

Skill level	File Management		Basic Operation		Word Processing		Spreadsheets		Database	
	Before	After	Before	After	Before	After	Before	After	Before	After
High/Very high	29%	60%	21%	49%	43%	72%	13%	25%	9%	18%
Moderate	33%	34%	41%	45%	36%	26%	23%	42%	24%	39%
Low/Nil	37%	6%	39%	6%	21%	2%	64%	33%	67%	44%
n : 1222~1235										

Skill level	Graphics		Internet		Telecommunications		Multimedia presentation	
	Before	After	Before	After	Before	After	Before	After
High/Very high	11%	37%	23%	57%	31%	58%	9%	35%
Moderate	27%	44%	40%	37%	39%	38%	19%	37%
Low/Nil	62%	18%	37%	6%	30%	4%	71%	28%
n : 1222~1235								

Demographic analysis of these results show some continued relationship between gender and teachers skill levels in favour of male and secondary teachers at the start and the end of the programme. The gender differences reduced over the period of the programme but remained significant across virtually all ICTs even at the end. The sector differences all but disappeared the end of the three years, the only notable remaining differences being that secondary teachers reported higher skill levels with basic operations and spreadsheets, and primary teachers reported higher skill levels in the use of graphics.

The impact of the programme on teachers' skill levels was clearly significant across the full range of educationally useful skills measured, though skill with certain ICTs such as spreadsheets among secondary teachers and multimedia and graphics packages among primary teachers seem to have been emphasized in the different sectors.

## Teacher confidence about the use of ICTs

Changes in the confidence of teachers about using ICTs were investigated with regard to two elements: their confidence as personal users of ICTs, and their confidence about using ICTs with classes of learners. Both of these increased significantly over the period of the programme from what were moderate and low levels of confidence respectively on entry.

At the end of the project, many teachers reported that at the beginning of the project they had been less than confident as personal users of ICTs. Seven percent of teachers classified themselves as having been 'anxious' and 24% of them were 'not confident' in this regard. By the end of the programme less than 1% of the teachers said they were 'anxious' and only 1% were still 'not confident' about the personal use of ICTs. By the end of the programme over four-fifths (84%) of teachers stated that they had become either 'confident' or 'very confident' about their personal use of ICTs.

Teachers' confidence about ICT use **with classes** also increased significantly during the programme. Teachers reported that on entry, they had been even *less* confident about using ICTs with classes than they had been about their personal use. At that point 14% of them self-identified as 'anxious' about this, and 30% identified themselves as 'not confident'. By the end of the programme, however, the percentage of 'anxious'

or 'not confident' teachers had dropped from 44% to 3%. Correspondingly, the percentage of 'confident' or 'very confident' teachers had increased from 28% to 77%. Figure 1 illustrates the change in teachers' confidence about the use of ICTs with classes.

Figure 1:   Teachers' confidence about using ICTs with classes before and after the ICT PD programme
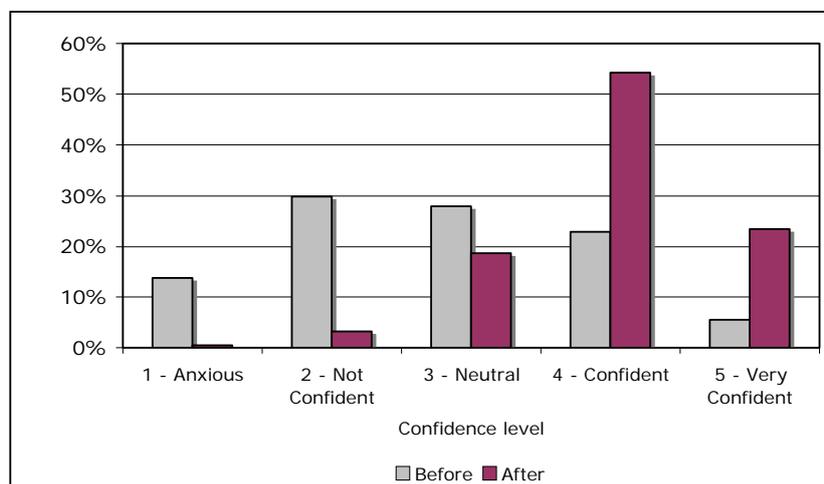

As was also the case for confidence gains in relation to personal use, these confidence gains in relation to *classroom use of ICTs* were related to all of gender, sector and length of involvement demographics. Female teachers made significantly more confidence gains than male teachers ($X^2>35$; df=3; p<.001), primary teachers reported significantly more gains in confidence about classroom use than secondary teachers ($X^219.28$; df=3; p<.001), and confidence gains were also positively correlated with the length of time teachers had actively participated in the programme ($X^2=22.89$; df=8; p<.001) (See Table 6, & Figure 2). The longer teachers took active part in ICT PD the greater the increase in their confidence about using ICTs with classes.

Table 6:   Increases in teachers' confidence about use of ICTs with classes during the programme, by gender and sector

Change in confidence	Female	Male	Primary	Secondary
Decrease	2%	3%	2%	2%
No change	27%	37%	23%	35%
Slight increase	35%	38%	38%	30%
Significant increase	41%	22%	38%	34%

Figure 2:   Increases in individual teachers' confidence about use of ICTs with classes, by length of active involvement in programme
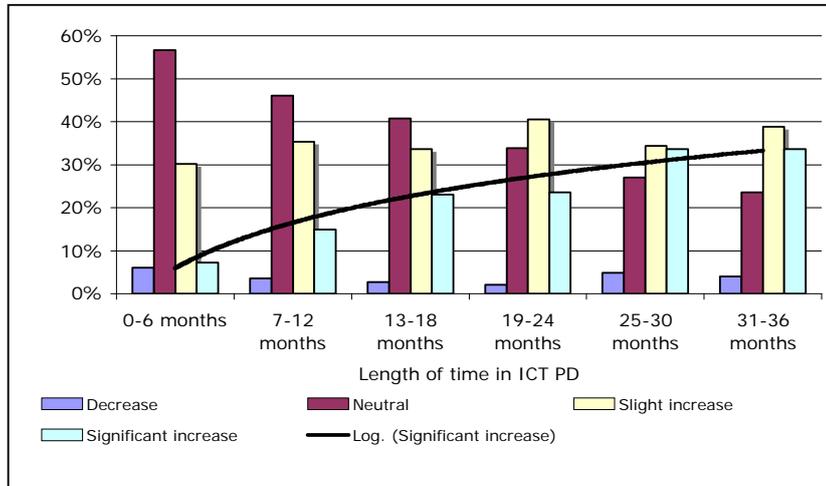
Teachers' understanding of the role of ICTs in teaching and learning

Teachers in this cohort generally had positive views on the role of ICTs in education. At the end of the programme many of the teachers' still felt there were a number of constraints on their effective implementation of ICTs into teaching and learning, but their views had, if anything, become even more positive about their potential in other respects, both in improving their teaching and in fostering effective learning.

To address this indicator of the impact of the ICT PD programmes on teachers, we asked teachers what they saw as the benefits of ICTs in teaching and learning on the basis of their experience with ICTs during the programme; what concerns they had about the incorporation of ICTs into their teaching programmes; how, if at all, incorporating ICTs had changed their ways of teaching, and the contribution the programme had made to their understanding of teaching and learning in general. Their responses to these questions give an overview of what the teachers' own broad understandings were at the end of the programme in relation to the role of ICTs in education and how widely spread such views were among them.

Benefits of integrating ICTs into teaching and learning

The qualitative analyses of previous cohorts reported benefits of integrating ICTs into their teaching and learning programmes, show that these may be grouped into about ten key categories (Ham et al 2005, 2006, Ham 2007). These are a mixture of teacher or teaching-oriented benefits and learner or learning-oriented benefits, with, from the teachers in this cohort, a heavy emphasis on the latter. The categories of benefit and their distribution for this cohort are:

Table 7:   **Examples and distribution of teacher-identified 'benefits' of using ICTs with classes (Percentages represent proportions of statements of benefit** (n=c.2707) relevant to a given category)

Teaching with more confidence and enthusiasm,	(1%)	• "…being able to advise students on areas of presentation and use of ICT that I previously knew nothing about." • "Students being more confident that I could help them." "I am now more confident teaching skills" • "[I'm] now enthusiastic and excited about using the computer." • "As I became a more confident ICT user, I Integrated it into my class programme, so everyone benefits." • "It means that I am using methods they are familiar with and the connect more to the work because of this."
Enhancing/expanding their own **teaching skill set** and **pedagogical knowledge**,	(1%)	• "The teacher becomes less visible in the learning process." • "Different style of teaching - a break from the usual routine." • "I mainly teach topic work so it added a new dimension to our teaching." • "There's more diversity in teaching styles." • "Teaching and learning have become student centred … Learning has to become co-constructed."
Using a wider **range and variety** of teaching-learning activities in class,	(8%)	• [There is]..an extended choice of research material / a variety of presentation ideas. • "I am able to use a variety of ICT and therefore able to pick out the best one for a particular job." "Variety of approaches to projects" • "Variety of Learning Experiences." • "Wider variety of resources." • "Gathering information from a wider range of sources and can now manipulate this information in various ways."
Allowing more **authenticity**, real-worldness and relevance to children's lives in teaching and learning tasks,	(4%)	• "Interest in computers as their writing was for an authentic audience, makes them want to blog more and more to communicate." • "The exposure of [the] world beyond classroom adds to what we are doing." • "Using it as an authentic learning tool which the children can relate to. This can sometimes lead to increased participation and interest." • "It's related to the real world …[and] Engaging in a way they relate to." • "[I see] Engagement, Relevance (real time information available) [and] Transfer (see skills used in a number of subjects)."
Making learning for students more **engaging** and interesting,	(28%)	• "High level of motivation. High level of success." • "Students are more involved in their learning." • "Increased enthusiasm and confidence in their abilities." • "Highly motivating and exciting way of presenting information and finding information." • "Children enjoyed the more professional look to their completed work." • "The children can become more engaged in there [sic] learning."
Facilitating more efficient learning of specific curriculum content and **curriculum objectives,** easier access to information, improved presentation etc.	(25%)	• "Using the computer as a tool for presenting their inquiry learning as well as gaining information through the internet has been a huge benefit." • "Improved quality of ICT presentations." • "A sense of achievement when they were doing maths activities (moved up a level)." • "It has allowed children with lower level Literacy skills to get involved at a deeper level than previously." •"[It's] easy to access information." • "Being able to widen their scope of information. / Use skills to present their findings in an improved manner."
Enabling a focus on **thinking skills** (esp. higher order thinking and metacognition),	(12%)	• "Developing thinking skills." • "Thinking skills have helped children to more effectively sort their learning and to think further than they would have." • "Their thinking skills have been extended" • "higher order thinking - creative answers to questions, extended their thinking / Reflecting - children can now reflect on their own learning."

Encouraging **collaborative or cooperative** enquiry, contributing to social skill development,	(9%)	• "More interactive group work is happening." • "Learning to work together and share when a group is working together on the computer." • "Students share their skills with others. Students teaching students." • "Students tend to work more collaboratively sharing and comparing sites and discussing information." • "Collaboration work, questioning skills very beneficial."
Making learning more **personalized** or individualized,	(7%)	• "[ICT] switches on the non reader with reinforcement activities." • "It was another way of learning for those who have difficulty." • "Greater ease of writing and presentation for slow writers." • "Use of ICT caters for a variety of different learning styles." • "Digital images are very powerful prompts for facilitating communication and independence with special needs students."
Fostering more **independence and agency** in student learning.	(5%)	• "Students are more empowered to solve problems themselves." • "Independence in utilising ICT technologies and approaches." • "Students are able complete independent inquiries and present these to a high standard." • "Gives independence to learning." • "Independence / Increased personal responsibility for learning / Knowledge of own learning habits." • "The development of some independence in their own learning."

Concerns

Technical issues, equipment reliability and inadequate access to ICTs for students seemed to account for most of the perceived constraints on ICT use, these being much more significant in peoples' minds than pedagogical issues. Over a third of the teachers, for example, identified significant concerns about access to equipment for students (38%) and reliability, (36%) alongside lack of time (37%) for themselves to become familiar with the range of ICTs available as their main persisting concerns around the use of ICTs with students at the end of the programme (Figure 3). As has also been the case for previous cohorts, many of the teachers at the end of the project felt there was still a need for continuing PD around ICT use, even though the programme had significantly increased and improved their effective practices in this regard, though in comparison with earlier cohorts the proportions of teachers expressing *significant concern*s at the end of the programme does seem to have reduced across the board.

Figure 3:   Teachers' continuing concerns about the use of ICTs with classes
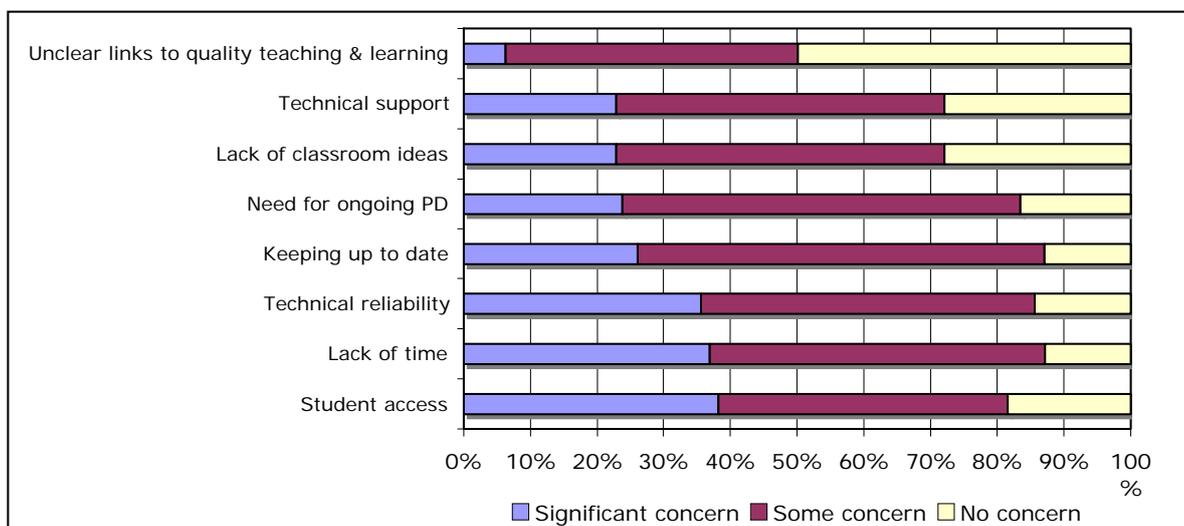
Contribution to wider understandings of teaching and learning more generally

When teachers were asked to describe the ways in which the ICT PD programme had contributed to their understanding of teaching and learning generally, responses ranged from 'no effect' to significantly deeper understandings of learning and pedagogy in general, well beyond the connection with ICTs.

Of all the comments made about the ways in which ICT PD programmes had contributed to teachers' 'understandings' of teaching and learning in general, about a third related to the specific connections they had been able to make about the educational value of ICTs in teaching and learning, rather than what they had learned about teaching and learning 'more generally'. Of those that did refer specifically to the role of the programmes in developing their 'more general' understandings of teaching and learning, about 18% said that there had been little or no contribution to their general pedagogical understandings, beyond the acquisition of practical ideas for integrating ICTs into their classroom programmes.

> **Examples of statements on student-centredness**
> • "By being able to have students use particular software I appreciate that they learn at a far faster rate than I am able to provide material. It has speeded up the learning process."
> • "Students are more involved in goal setting learning intentions assessment."
> • "Made me think more about what the students need in their future."
> • "More flexibility & student centred research."
> • "[It has] extended my knowledge of systems of delivery and understanding and application of student centred learning systems."
> • "Much more child centred and cooperative learning approach."
> • "Students are more engaged in the learning as a result of the ICTs. Students are now creating and expressing themselves in a wider range of ways."

About half the comments of teachers, however, did identify such deeper or wider understandings and identified a number of key ways in which the programme had supplemented, challenged and even changed those understandings.

Many of these (c. 11% of total comments) involved teachers reporting that they now had a better understanding of *student-centred teaching and learning,* or that in some way their teaching had become more student-focused or more relevant to students as a result of the programme.

An even larger proportion (c. 30%) stated that they had significantly increased their knowledge of different *teaching/learning styles and theories*, or were enabled to make clearer connections between their day to day practice and the various learning and teaching theories and models outlined in the programmes. Most prominent among the particular theories and models identified were 'enquiry learning', 'learning styles', 'collaborative and/or cooperative learning', and various taxonomies of 'thinking skills' (Bloom's, SOLO etc.).

> **Examples of statements about linking practice with learning theories, models and research**
> • "awareness of use of pedagogies eg Brain based learning/inquiry/ability to link chn to world outside classroom with greater relevance and immediacy."
> • "Provides increased opportunities for co-operative learning Supports a range of learning styles."
> • "[I'm] making use of learning processes multiple intelligence theory."
> • "It was good to read some up to date articles on learning theory."
> • "I have added to existing knowledge on Inquiry learning, have a better understanding of our research can impact teaching and learning."
> • "Being introduced to a variety of thinking and learning strategies such as Habits of Mind, SOLO, and the Fish Philosophy has encouraged me to become more reflective about what is happening in class and it has rubbed off on the children as well."

Thirdly, there was also a substantial proportion who commented on the programme as *challenging and changing their pedagogical perspectives and under-standings*, either through the content of the PD programme, or, more often, through the opportunities it provided for sharing and critical discussion with colleagues, outside 'experts', and so on. Many of these comments spoke of the teachers adopting a more 'critical' or more 'reflective' approach to their teaching as a result of their new awareness of pedagogical and learning theories and research.

Finally, we note that there were two elements of significant sector difference in the nature of the comments on wider deeper understandings gained from the programmes. The first is that primary teachers were twice as likely as secondary to comment on increased understanding of specific learning theories. The second is that secondary teachers were twice as likely as primary to state that the programme had had little or no effect on their pedagogical understandings in the broader sense.

> **Examples of statements about challenging their pedagogical approach and understandings**
> • "It has helped me become a more multi media teacher."
> • "Evaluating and reflecting on why we teach the way we do has really developed my understanding of teaching and learning."
> • "Over the last 3 years I have been challenged to think about; childrens learning, the inquiry process, thinking skills, how the brain works.... I wonder who will challenge my thinking about my teaching and classroom programme now the contract has finished?"
> • "My teaching and planning has changed to automatically incorporate ICT where appropriate."
> • "Reading the thoughts and views of global web2.0 experts and communicating directly with them has given me a better perspective on the learning required for children of the 21st century."
> • "The course/conference PD provided ideas for reflecting on teaching and learning."

Teachers' classroom practices

When teachers were asked about the extent to which their classroom practices had changed as a result of participation in the ICT PD programme, over a third of them indicated their classroom practices had changed to 'a large extent' or 'completely', and just under half of them (48%) said their classroom practices had changed 'to some extent'. Only a very small group (3%) said no change had occurred in their classroom practices at all (Table 8).

Table 8:   Changes in teachers' classroom practices

Extent of change in classroom practices	%
Not at all	3%
Very little	11%
To some extent	48%
To a large extent	33%
Completely changed	5%
Grand Total	1215

There were sector (but not as in previous cohorts, gender) related differences in teachers' responses to this question. Primary teachers stated higher levels of change in their classroom practice than secondary teachers ($X2>35$, df=4, $p<0.001$). Whereas 43% of primary teachers indicated a complete or large change happened to their classroom practices, 25% of secondary teachers respectively indicated the same levels of change (Table 9). While the great majority (86%) of teachers reported at least some element of change in their classroom practices, secondary teachers were almost twice as likely as primary teachers to be in the group of teachers reporting little or no change in classroom practice as a result of the programme.

Table 9: **Changes in teachers' classroom practices by gender and sector**

Levels of change in classroom practice	Female	Male		Primary	Secondary
Not at all	3%	5%		3%	4%
Very little	10%	13%		9%	15%
To some extent	48%	48%		44%	57%
To a large extent	34%	31%		37%	23%
Completely changed	6%	3%		6%	2%
N	907	308		867	332

Effects of the ICT PD Programme on Student Learning

The ICT PD clusters contracts identify several performance indicators related to the expected downstream student learning effects of the professional development. At a general level there is an expectation that the ICT PD programmes would "facilitate improvements in students' learning, engagement and achievement." This was to be evidenced through:

1. increases in 'instances of teaching using ICT with classes to facilitate the learning of students', and

2. identifying 'instances of teachers aligning ICT use with student learning'

The surveys provide both quantitative evidence of the extent of such increases in classroom use of ICTs in the cluster schools, and qualitative evidence of the nature of the 'alignment' of ICT use with a range of student learning objectives.

Increased classroom usage of ICTs

One measure of increased classroom use of ICTs during the programme is the change in proportions of 'high usage' teachers (those who integrated ICT based activities into "all" or "most" of their units of work) at the beginning and end of the programme. In this cohort the proportion of 'high usage' teachers increased from 13% at the start for the programme to 47% at the end. Conversely, the proportion of teachers who did not integrate ICTs at all decreased from 20% to 4% (Table 10). These figures were almost identical to those for the previous (2004-2006) cohort.

Table 10: **The proportion of units of work in which ICTs were incorporated before and after ICT PD, as reported in the end of project surveys**

	% of teachers before the programme	% of teachers after the programme
All or almost all units	4%	18%
Most units	9%	29%
Several units	19%	31%
One or two units)	49%	18%
No units	20%	4%

'Low/No usage' = ICTs incorporated into 'no' or 'one or two' units of work in the year before ICT PD
'High usage' = ICTs incorporated into 'most' or 'all' units of work in the year before ICT PD

The increase in the frequency of participants' usage of ICTs with classes over time was correlated with both sector and length of time in the ICT PD programme. In particular, primary teachers increased their classroom usage significantly more than secondary teachers. At the end of the programme well over half of primary teachers were using ICTs in most or all of their units of work, compared with just over a third of secondary teachers. Those who had been in the programme longer also tended to report use of ICTs in a higher proportion of units than those in the programme for shorter periods. At the end of the programme about a

third of those who had been actively involved in the programme for less than a year were 'high usage' teachers. By comparison, almost twice as many (58%) of those who had been active in the programme for more than two years were 'high usage' teachers at the end of the programme.

Aligning ICT use with student learning outcomes

In the surveys we asked teachers to identify the specific learning activities their students had taken part in during the PD programme, the Essential Learning Areas covered by these activities, and the specific *student learning outcomes* they expected from or observed during those activities. These observed learning outcomes provide a window into what the teachers saw as the 'quality learning experiences' using ICTs provided during the programme.

A qualitative analysis of data from previous cohorts surveys (Ham et al. 2006) has suggested that, in teachers' minds at least, the learning *outcomes* most often demonstrated when students use ICTs can be grouped into four main categories:

1. Student motivation and engagement.

2. Generic thinking skills – (Presentation & Communication, information processing, higher order thinking, and creativity).

3. Generic social/collaborative skills

4. Specific curriculum content knowledge and objectives, including technical (ICT) skills and knowledge.

The 2005 cohort's identification of the alignment of ICT-based classroom activities with student learning outcomes is outlined below under these same key categories.

1. Increased use of ICT-based activities for student motivation and engagement with learning tasks.

The routine involvement of students in ICT activities with motivation/engagement learning intent or outcomes more than doubled over the period of the programme (Table 11).

Table 11:   Proportion of teachers reporting frequent use of ICTs in classrooms for motivation/ engagement outcomes before and after the ICT PD programme

		Frequency		
Activity focus	Time	High (Avg weekly or daily)	Moderate (Avg once a term)	Low (Not at all or once or twice per year)
Motivation/Reward/ Engagement	Before ICT PD	15%	19%	65%
	After ICT PD	30%	23%	48%

2. The acquisition and demonstration of a range of generic communication and cognitive skills.

- Communication skills

The use of ICTs such as faxes and emails for *interactive*, topic-related communication, for example making enquiries of experts outside the classroom or engaging with social networking websites for classroom learning purposes, did not increase dramatically over the period of the programme at a national level, though we note that the proportion of teachers whose students had 'never' engaged in these kinds of activities did reduce from 71% of teachers to 38%. The proportion that reported regular student use for this purpose several times a term increased from 7% to 20%, but neither of these became daily or weekly occurrences in the great majority of teachers' classes by the end of the programme (Table 12, below).

By contrast, though, the majority of teachers *were reporting student* use of ICTs quite regularly for other communication activities by the end of the programmme, notably by way of presentations of their work to teacher or peers. By the end of the programme, for example, the proportion of those whose students had 'never' or 'rarely' used ICTs for multimedia presentations had decreased from 73% to 41%. Conversely, by the end of the programme the students of well over half of the teachers were engaging in this at least several times a year or several times a term. Student use of ICTs for static print presentation had been rather more common prior to the programme, but this too increased over the period of the programme. By the final year of ICT PD the students of almost a half of teachers were using ICTs for static print presentations on a very routine (weekly or better) basis, and four fifths on a regular (termly or better) basis.

In all three aspects of ICT use for communication skills, primary students were likely to be involved in these activities more regularly than secondary students.

Table 12:   Frequency of students' engagement in ICT based activities connected to communications skills, before and after the programme

Classroom activity	Time	Frequency		
		High (Avg weekly or daily)	Moderate (Avg once a term)	Low (Not at all or once or twice per year)
Static print production / presentation	Before	17%	13%	53%
	After	48%	35%	19%
Multimedia presentation	Before	4%	13%	73%
	After	19%	40%	41%
'Online' interaction with others (email, fax etc)	Before	7%	7%	86%
	After	19%	20%	61%

- Information Processing

As had been the case with previous cohorts, the increase in regular student use of ICTs was most dramatic in relation to searching for, gathering or processing information, especially from the Internet. Teachers reported a significant increase in students' regular engagement in such activities over the programme. For example, 54% of teachers reported that their students had never or only rarely accessed or searched for information on the Internet before the programme. By the end of the programme the

students of four fifths (81%) of the teachers in the programme were using ICTs for information processing on a regular (termly) or routine (weekly or daily) basis (Table 13).

Primary students were more likely to be involved in using ICTs for information processing as regular or routine users than secondary students (58% cf. 41%).

Table 13:   Students' engagement in ICT-based activities related to a variety of cognitive skills before and after the programme

Classroom activity	Time	Frequency		
		High (Avg weekly or daily)	Moderate (Avg once a term)	Low (Not at all or once or twice per year)
Creativity	Before	7%	13%	80%
	After	20%	32%	48%
Information gathering/ processing	Before	20%	27%	54%
	After	53%	28%	19%
Higher Order Thinking, problem solving etc.	Before	4%	10%	85%
	After	14%	22%	64%

- Higher Order Thinking skills

As can also be seen in Table 13, when teachers were asked about ICT activities associated with higher order thinking skills such as problem solving or synthesis and evaluation, the results show that the proportion of 'regular' and 'routine' users of ICTs for these outcomes more than doubled over the period. However, such increases were less than those noted for information gathering and were lower also than those reported for communications and creativity-based activities. This was also the cognitive outcomes area in which secondary students engaged with ICTs as regularly as primary students, reflecting perhaps a relatively higher use of simulation software, spreadsheets, data loggers and the like, which are often associated with such problem solving activities.

- Creativity

In relation to ICT activities specifically aligned with creativity as a learning outcome the proportion of low frequency-users of ICTs for creative activity almost halved over the period, from 80% to 48%. Conversely, the proportion of routine users increased from 7% to 20%. The greatest student use of ICTs for creative activities were in the 'regular' (termly) rather than 'routine' (weekly/daily) categories. Proportionally more primary teachers also used ICTs with students for creative activities than secondary teachers. This possibly reflects the relatively greater role of activities such as 'creative writing' and 'story telling' in the primary sector.

3. ICTs for collaborative or social learning

The frequency of student engagement in ICT based activities related to collaborative learning, social interaction, and a sense of being part of a learning community, such as working in groups to solve a problem, collaborating on DTP projects etc, also increased over the period of the programme, though there was much less emphasis on these learning outcomes in ICT use than on other outcomes such as communication, information processing and the like. Over four fifths (85%) of teachers said their students had never engaged in ICT based activities connected to collaborative learning and social interaction during the year prior to the programme, though by the end of the programme this had reduced to 61%. The proportion of teachers who reported high levels (daily or once/twice a week) of their students' engagement in collaborative ICT based

activities increased from 5% to 16%. Again, the bulk of the proportional increase seems to have occurred from the non-use or rare use categories to those of occasional or regular use.

Table 14: **Students' engagement in ICT-based activities related to collaborative and social learning, before and after the programme**

		Frequency		
		High (Avg weekly or daily)	Moderate (Avg once a term)	Low (Not at all/once/ twice per year)
Classroom activity	Time			
Collaborative learning and social interaction	Before	5%	10%	85%
	After	16%	23%	61%

## 4. Curriculum content, Essential Learning Areas & technical skills

There was also an increase in the frequency of students' use of ICTs for reinforcement of content knowledge, practice at rule application and concept learning through the use of drill and practice, educational games, tutoring software and the like. Again, the proportion of teachers' whose classes had rarely or never used these technologies for these purposes reduced noticeably over the programme, and conversely the proportion of teachers who reported daily or weekly student engagement in such classroom activities increased. By the end of the programme well over a third of teachers, and proportionally more primary than secondary teachers, were reporting routine (weekly or daily) use of ICTs for curriculum practice of this type.

Table 15: **Students' engagement in ICT-based activities related to curriculum practice and technical skills, before and after the programme**

		Frequency		
		High (Avg weekly or daily)	Moderate (Avg once a term)	Low (Not at all or 1-2 times a year)
Classroom activity	Time			
Curriculum practice	Before	16%	18%	67%
	After	39%	25%	36%
Technical skills	Before	19%	21%	60%
	After	49%	27%	24%

Essential Learning Areas

The largest proportion of ICT-based student activities reported by teachers related to the Languages Essential Learning Area (26%), followed by Mathematics (15%), Science (13%), and Social Studies (12%) (Figure 4, below). We note this represents a smaller, rather more even, spread across the Learning Areas than in previous cohorts.

Figure 4:   Students' use of ICTs by Essential Learning Area
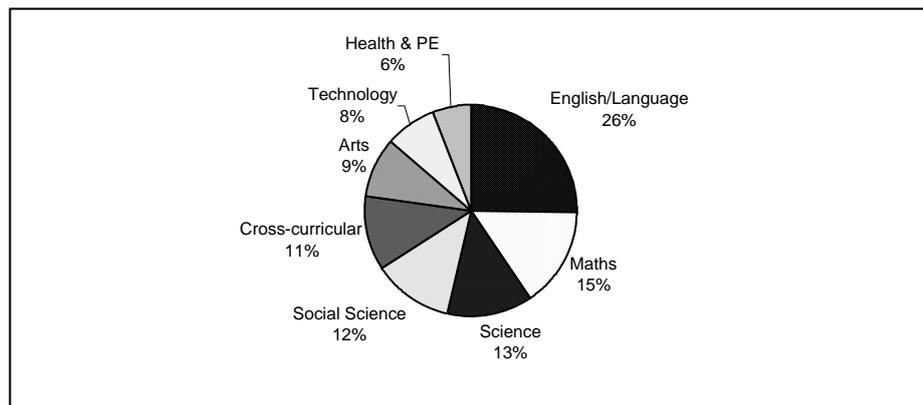
ICT skills as a learning outcome

Interestingly, and as had also been the case with previous cohorts, a significant proportion of identified learning outcomes of ICT use, and a significant amount of regular use of ICTs by students, related to student acquisition of ICT skills *per se*. The tendency to view technical skills acquisition as a legitimate outcome for computer based learning activities was especially strong amongst primary teachers, over half of whom reported that they routinely used ICTs for such a purpose at the end of the programme (cf. 30% of secondary teachers).

As noted in the report on the 2003-5 cohort (Ham et al 2006), this is perhaps testimony to the notion held by many teachers that pre-taught technical skills are a prerequisite for effective learning activity with ICTs, even as the focus of the PD itself moved towards pedagogical and learning issues. It also perhaps reflects the view that technical skills themselves are a legitimate outcome of students' experience at school, along with curriculum knowledge, cognitive skills and other benefits. Teachers often see the role of technical skill acquisition through ICT use not just as preparation for further school lessons. It is also a part of a wider function of preparing the students for a technologically permeated future. ICT skills seem very much seen as useful 'life skills' and part of a necessary preparation for functioning in 21st Century society.

Participant Evaluations of the Programme

Teacher satisfaction with the programme

Generally, teachers indicated high levels of satisfaction with their programme in relation to meeting their goals and, even though c.18% of teachers entered the programme stating that ICTs were a low PD priority for them, the great majority by the end felt it had been a positive force in their recent development as teachers.

Substantial majorities of the participating teachers indicated that their goals had been met to a large extent or better. Overall, about a fifth of teachers felt their goals had been fully met or exceeded, and about 42% felt their goals had been largely met. A small group of 5% of teachers felt their goals had not been met, the majority of these being secondary teachers.

Teachers were asked about three kinds of goals: technical skills, practical ideas for classroom uses of ICTs, and improved quality in teaching and learning. For all three goal types, just under two thirds of the teachers said that these goals had been largely met, fully met or exceeded (Table 16).

Table 16:   Levels of ICT PD goal achievement reported by teachers

Level of achievement	Goal		
	Technical skills	Classroom ideas	Quality of teaching and learning
Exceeded	3%	6%	4%
Fully met	10%	14%	16%
Largely met	44%	41%	41%
Partially met	38%	34%	34%
Not met	5%	5%	5%
N	1178	1132	1144

In this cohort, the differences between primary and secondary teachers in terms of levels of goal achievement were present, but less significant than in previous cohorts. Primary teachers reported higher achievement levels compared to secondary teachers for goals related to classroom use and ideas and improving teaching and learning generally, but not in relation to technical skill acquisition.

Figure 5:   Proportions of teachers reporting extent to which their goals/expectations of the ICT PD programme had been met, by length of time in the programme (with trendlines)
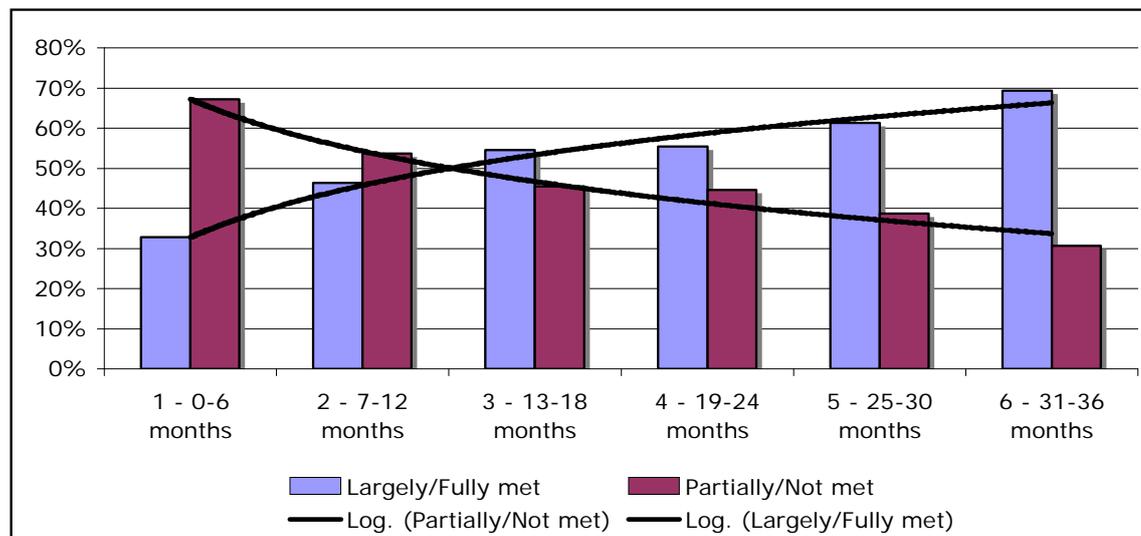

As has been found in relation to many other effects of the ICT PD programmes, there was a significant correlation between the length of time individuals were involved in the programme and their level of goal achievement. Across all three goal types, and for both sectors, the longer the period of involvement, the higher the levels of goal achievement. Figure 5 shows this relationship between satisfaction with programme and length of involvement. In the first six months the proportions of teachers largely/fully satisfied and those only partially or not satisfied are virtually equal. By the end of the three years well over twice as many teachers were largely/fully satisfied their goals had been met as felt they had only partially or not been met.

The ICT PD programme's contribution to teachers' increased ICT usage

Teachers were asked directly about the extent to which their increased use of ICTs with classes over the three years of the programme were directly attributable to the programme. The great majority of teachers (93%) indicated that the increase in their ICT usage was attributed either completely, largely or partly to the ICT PD programme. Some 57% said that their increased use of ICTs with classes was either largely or completely attributable to the programme (Figure 6).

Figure 6:   The extent to which increased use of ICTs with classes is attributable to the ICT PD programme
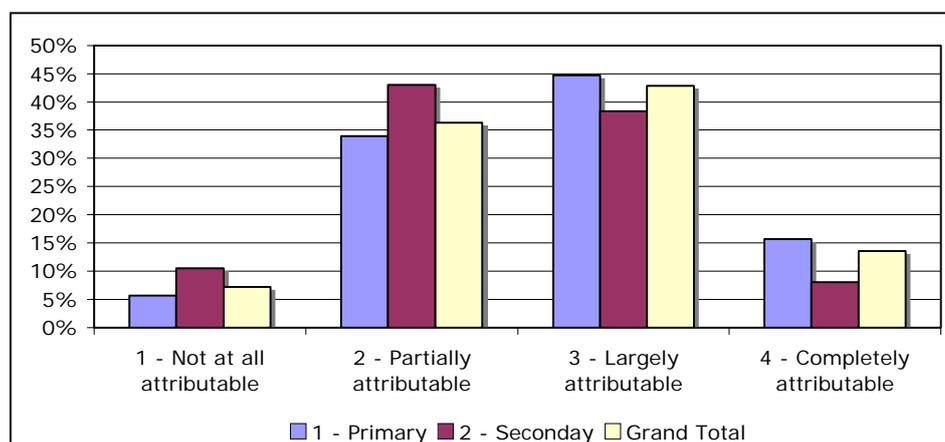
In a triangulating question, teachers were asked how significant the programme had been in contributing to their overall development as professionals. If anything they were more positive on this than they had been in the question about attribution to usage, a similarly small minority (6%) said it had not been significant to their overall development. But a rather larger proportion of two thirds (66%) of teachers indicated that the programme had been either 'significant' or 'very significant' as a factor in their overall development as teachers. Primary teachers were rather more likely than secondary teachers to attribute general professional significance to the programme.

Teachers' evaluations of the delivery of the ICT PD programme

When teachers were asked to comment on the particular aspects of their particular programmes that they most and least appreciated, they often commented on similar issues. The feedback in relation to the most and least appreciated aspects are summarised in the exemplary statements in the boxes below, categorised by:

- **Programme content** (32% of statements of appreciation). Statements by teachers about the *content* of their ICT PD programmes and their particular cluster models centred around learning new technical skills; gathering and sharing practical ideas for ICT integration into classroom curriculum programmes; and learning about principles of effective teaching and learning in general.

- The skills and effectiveness of the **Facilitators and other leadership elements** (17%). As has been the case in most cohorts, many of the comments highlighted the pivotal role of able, knowledgeable and professionally skilled facilitators. Teachers required their facilitators to be technologically and pedagogically knowledgeable, willing to adopt a supportive, empathetic attitude, and always 'available'.

- **Programme delivery** (18%). The organizational aspects of programme delivery appreciated most were the personalized attention many facilitators were able to build into their programmes, small group sessions, one to one help, in-classroom visits, arranged visits among schools, and practical (ie: hands on and/or interactive) workshops.

- The teachers' involvement in various **'Learning communities'** (33%) as part of their programmes. Teachers often commented on the various opportunities that accompanied the programmes to share learning and experiences both within and beyond the cluster, and the contribution these made to developing a 'community of practice' around the programme. Most prominent among these opportunities were the national conferences, outside/overseas visitors and experts, meeting other teachers from other schools, and sharing expertise and knowledge with colleagues through various 'celebrations' and events both within and outside the cluster context. This, along with programme content, was the aspect of the programmes most often mentioned when teachers were asked to identify the most appreciated aspects of the programme. More appreciative comments related to the notions of collegiality and learning community in the programmes than to the other categories identified.

Examples of comments on the 'most appreciated' aspects of the programmes that were coded as being about opportunities for sharing, celebrating and presenting

- "The opportunities to attend conferences, share ideas with like minded people, the online sharing have all contributed. And also the great opportunities to network and form long lasting professional friends all over the nation"
- "Collegiality across schools opportunity to access live experts both local and international"
- "To be able to share ideas with other teachers and visit schools to see how they do things has probably made the biggest impact on my teaching."
- "Collegial support within the school and cluster. Opportunities to be part of whole school PD in eg. thinking workshops/ speakers "
- "Sharing within the community.
- "collaboration with other schools and teachers, access to conferences and visiting speakers"
- "Attending Lead Teacher Days. Assistance from Facilitator. Attendance at ULearn. Success of Cluster Wide exhibition."
- "The chance to look at other schools and see that we are doing extremely well. Also the PD with Jamie McKenzie - very inspiring. Going to ULearn."
- "ULearn, GDITE course, Cluster share, networking."
- "Collegiality and networking"
- "Study tours PD involving the Wairarapa cluster networking among staff on a similar level to me"
- "The highlight was the ICT conference in Rotorua at the beginning of the year...lots of great ideas, networks, skills etc."
- "it was a good challenge for me to teach teachers and share knowledge I had gained by attending learning@schools conference."

In terms of suggestions for improvement of the programmes, the most often identified suggestions related to:

- giving more time for teachers to practice what they have learnt, and perceived work overload to fulfill the demands of the PD,

- continuing the PD opportunity after the contract period,

- providing greater variety in ICT sessions,

- increasing the opportunity for one-to-one, in-class support from facilitators,

- tailoring the PD better to the needs of individuals or doing more effective needs analysis

- improving technical support in schools to avoid ICT failure,

- improving student access to computers and software,

- providing even more opportunity for collegial networking and building learning communities.

Most of these paralleled the 'concerns' about integrating ICTs discussed in an earlier section.

Comparisons with Previous Cluster Cohorts

Teacher skills

The reported increases in skill levels over all five of the ICT PD programmes that have been completed to date were considerable for all cohorts, especially for female and for primary teachers.

Similar proportions of teachers in the early 2001and 2002 cohorts reported 'moderate' or 'high' skill levels at the end of their programmes. Noticeably higher proportions have reported such levels since the 2003 cohort, except in the case of graphics skills, which have remained relatively static across all cohorts (Figure 7). There has been a noticeable 'levelling off' of end of project skill levels at 'high' or 'very high' levels across all ICTs measured since the 2004 cohort.

Figure 7: **Proportion of teachers reporting moderate to very high skill levels at the end of ICT PD programmes, across a range of ICT skills, 2001-2005 cohorts**
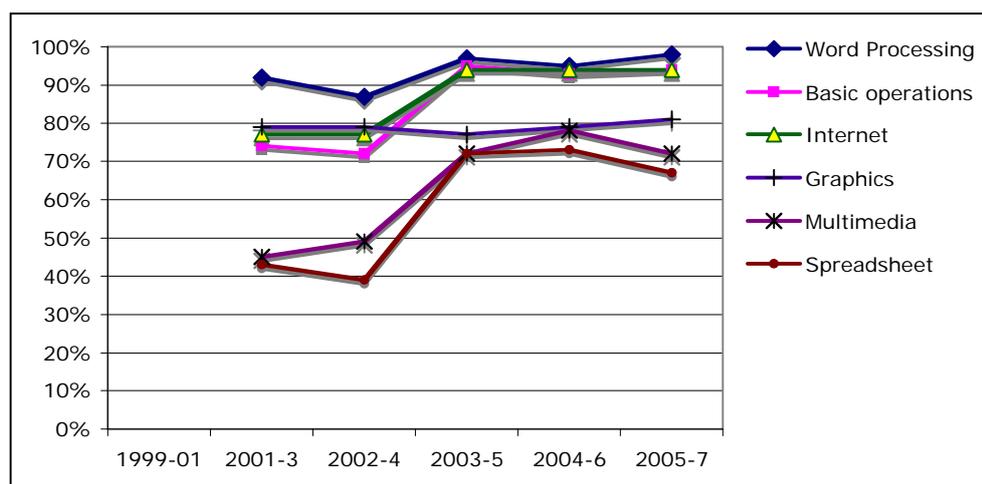
Reported *gains* in ICT skills during the programme were also greater in the earlier cohorts than in the more recent cohorts. This may be largely explained by increasing entry-level skills among each successive cohort. The noticeable 'shift' that occurred between 2003-2005 may be the effect of the laptop scheme, which was 'rolled out' during the 2003 and 2004 cohort programmes.

The particular skill areas where the greatest and lowest gains in competence were reported over the period of the 2005 cohort programme, were similar to those reported by both earlier cohorts.

Teacher confidence

For all cohorts, reported *increases* in confidence as a consequence of the ITCPD programmes have been significant, both with regard to teachers' personal confidence with ICTs and their confidence about student use of ICTs in their classes (Figure 8). Large proportions of teachers from all cohorts have reported moderate and high levels of confidence about ICT usage at the end of the programme. The relative increases in classroom confidence are significant for all cohorts and may be slightly decreasing in magnitude over time.

However, for all cohorts gains in and levels of personal confidence continue to exceed those in confidence about classroom use of ICTs.

Figure 8: Proportions of teachers reporting confident to very confident levels of confidence with ICTs before and after ICT PD programmes, 2001-2005 cohorts
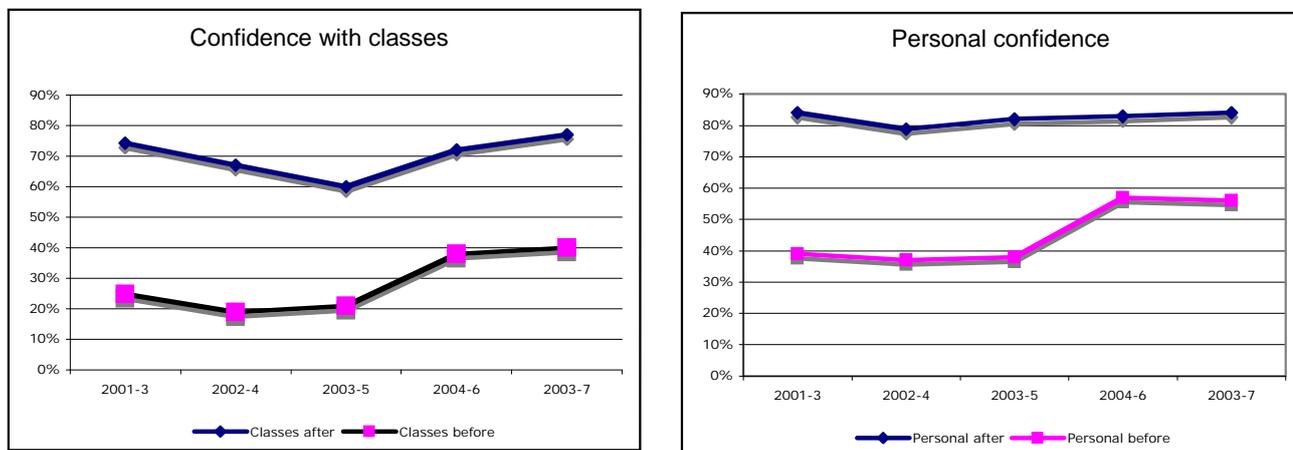
Increased classroom usage

Figure 9: Proportion of teachers whose students routinely* used ICTs for classwork before and after the ICT PD programme, 2001-2007
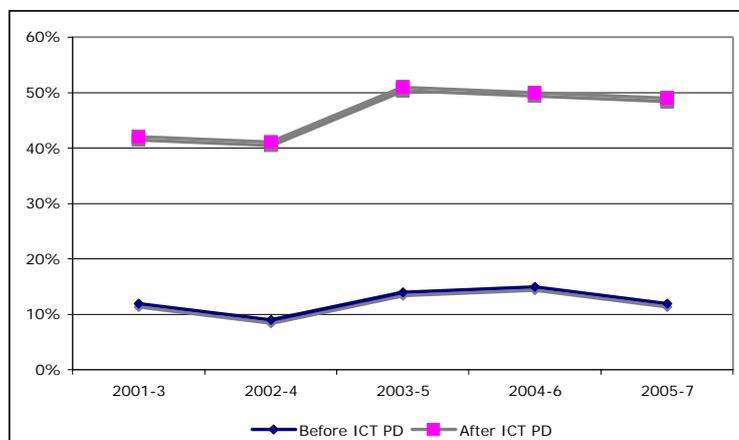
(*ie: ICTS were incorporated in 'all' or 'most' of their units of work over the previous year.)

The extent to which teachers integrated ICT-based activities in ICT PD cluster classes increased significantly from quite low entry points, and to similar extents, for all four cluster cohorts for which there is comparable data. For all of the last three cohorts, about half of the teachers at the end of the programme were *routinely* incorporating ICTs into 'most' or 'all' student units of work, and three quarters or more were doing this at least 'regularly' ('several units' or more).

Student learning activities

On those indicators where direct cross-cohort comparison is possible, there seem few significant differences among cohorts with regard to the types of learning outcomes reported for classroom use of ICTs, or in the reported increases of such use over the period of the programmes.

Generally, and certainly since 2003, each cohort seems to be achieving slightly higher rates of usage of ICTs for various student outcomes than the previous cohort. It is noted, for example, that entry point student use of ICTs for online communication (mostly emailing) and problem solving have stayed relatively stable over more recent cohorts, while exit levels of such use have shown slow increases since 2002.

Student use of ICTs for information processing (predominantly Internet use) continues to show the greatest increases across the cohorts. Use of ICTs for problem solving activities, reported previously as declining from 1999 to 2002 cohorts, is still comparatively low, but has recovered to exceed earlier levels in more recent cohorts. Most of this 'problem solving' use is explained by secondary student use of spreadsheets, data loggers and the like, in the 2003, 2004 and 2005 cohorts. The same 'recovery' trend is shown in respect of *post*-programme routine use of ICTs for curriculum practice (Drill & Practice, computerised tutorials, multimedia books etc).

The *increases* made during the programmes in were similarly large for all cohorts. Increased student use of multimedia production tools for presentation continues to be a major contributor to increases in ICT use for 'static communication', especially in primary schools.

Figure 10:   Proportions of teachers' reporting frequent* classroom usage of ICTs for various learning outcomes, before and after the ICT PD programme, 1999-2007
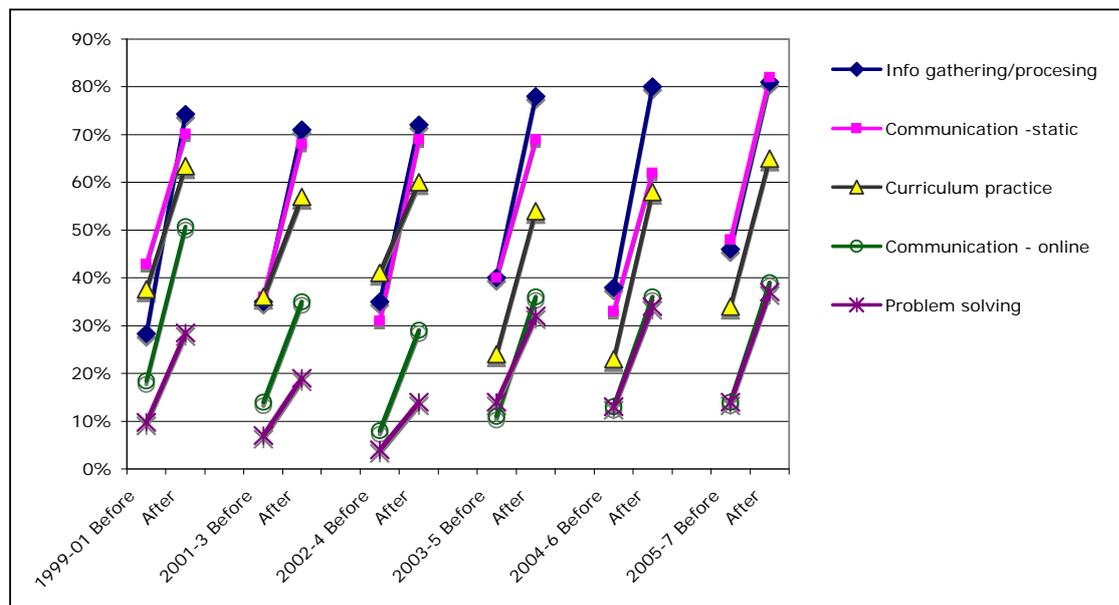
(*At least once or twice per term on average in the previous year)

The distribution of student usage across Essential Learning Areas at the end of projects shows few clear trends across the cohorts, except perhaps for the continued predominance of ICT use for Language objectives and a slight decline in the proportion of ICT activities for Mathematics. Language activities account for the highest proportion of classroom ICT activities in all cohorts. The proportion of activities in the Language area increased noticeably between the 2003 and 2004 cohorts, apparently at the expense of Social Studies and Mathematics activities but this trend was reversed in the current (2005-7) cohort (Figure 11).

Figure 11:   Proportion of ICT activities by Essential Learning Area, 1999-2007
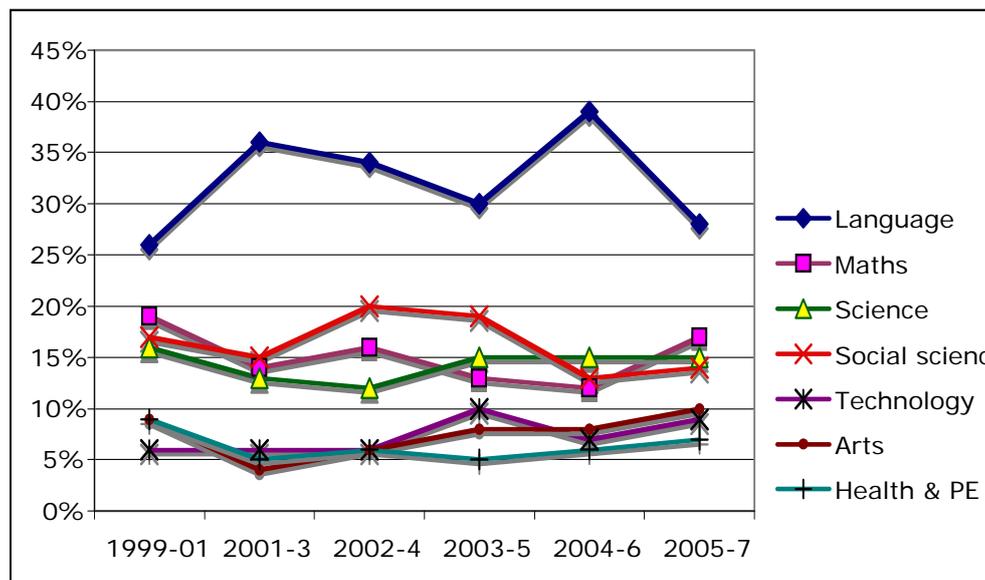
Participant satisfaction with programme

Finally, we note that levels of goal achievement and expectations met were similar to, but not quite as high as, those achieved in the 2004 cohort, but were higher than those than achieved in the earlier 2003 cohort, across all of the groups of goal identified. We attribute the lower satisfaction levels reported by the 2003 cohort to the fact that there were proportionally more secondary teachers, and more teachers for whom ICTs were a low priority on entry in the 2003 cohort compared to the two more recent cohorts. Both these groups tend to report lower end-point satisfaction levels.

Figure 12:   Proportions of teachers reporting their PD goals were 'largely met', 'fully met' or 'exceeded'
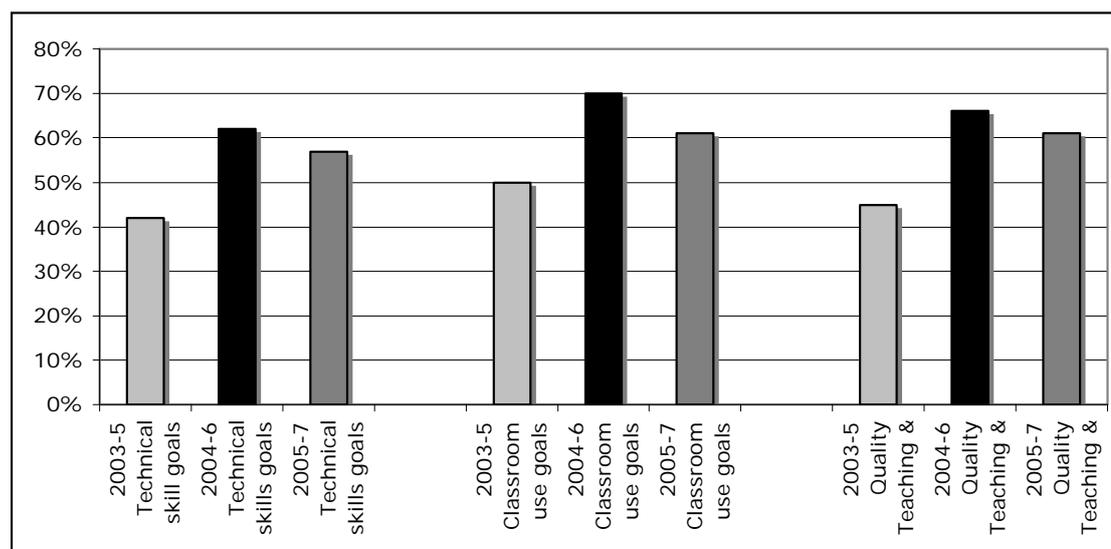
For all cohorts that were asked this question, participant satisfaction has varied by both sector and length of time in the programme, with both primary teachers and those in the programme for longer stating higher

levels of satisfaction and goal achievement than secondary teachers and those in the programme for less time.

Conclusion

The overall conclusion arising from the study is that the 2005-2007 ICT PD programme had a marked and significant effect on the teachers and students in cluster schools with respect to all of its key goals. There were high levels of goal achievement reported by participants, and marked increases or changes with respect to all of the Ministry's objectives as outlined in cluster performance agreements.

At the national level, the programme continues to achieve its overall goals of increasing teachers' skills and confidence with ICTs, improving teachers' understandings of the educative purposes of using ICTs in teaching and learning, increasing classroom usage of ICTs, involving schools and teachers in effective communities of practice for professional development, and providing quality ICT-mediated learning experiences for students. While stating these as general effects on the population of cluster teachers and classrooms as a whole, we note that at a national level, the ICT PD programme continues to have a greater impact among primary teachers than among secondary teachers, and a greater impact among those who take part for the majority of the duration of the three-year programme.

References

Ham V, (2007) National Trends in the ICT PD School Clusters Programme 2004-2006. A Report to the New Zealand Ministry of Education. Wellington. Ministry of Education

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APPENDICES

Appendix 1. Performance Measures for ICT PD Clusters 2005-7

Appendix 2. End of Project Survey Questionnaire, 2007

Appendix 1. Performance Measures applying to the 2005-7 cohort of ICT PD School Clusters in the last year of their programme

Intended Outcomes	Success Criteria/Evidence
Teachers' confidence and skills in using ICT have increased.	Evidence shows participating teachers have increased confidence and skills in using ICT. Instances of teachers using relevant electronic and online material and resources.
Increased capability of teachers and principals to use ICT for their own professional learning and to facilitate improvements in students' learning, engagement and achievement.	Evidence shows improved understandings of the role of ICT among most participants. Instances of teachers aligning ICT use with student learning. Instances of teaching using ICT that facilitate the learning of students and raise achievement for all learners.
Strengthened professional learning communities and increased collaboration within and across schools. Development of a rigorous professional learning community focused on critical reflection of practice using ICT. Developing rich resource of expertise, experience and materials in effective ICT use at a national and local level.	Evidence of participation and contribution from participating teachers and principals to local, regional and national conferences, the online learning network and cluster network communities. Instances of discussions within and between schools, focused on student achievement and changing teaching practice and how ICTs can contribute to these. Instances of information, strategies, case studies, action research or resources contributed to: • Te Kete Ipurangi • Conferences • Publications • Online and other relevant environments.

ICTPD School Clusters Professional Development Programme
2005 – 2007 Clusters
END-OF-PROJECT EVALUATION – paper version

This questionnaire is being distributed to all **teachers** who have been involved in the ICT School Clusters Professional Development Programme, so that you may contribute to the end-of-project evaluation of the Programme. It is part of an ongoing, independent research project on the ICTPD School Clusters.

> Individually attributable responses will be kept strictly confidential to the independent research team, though a set of anonymous, unattributable responses for each cluster will be sent to the cluster contract holder (usually the Principal of the lead school), and/or cluster project Director and/or cluster Facilitator to assist them with final Milestone reporting.

DEMOGRAPHICS

Cluster Name or Lead School:	Drop down list
Your Name: (Needed for comparison with the baseline survey done at the beginning of the project)	Text box
School: (Needed for comparison with baseline survey.)	Drop down list
Gender:	☐ Female ☐ Male
School Sector you *mostly* teach in	☐ Primary ☐ Secondary ☐ Both
Length/Duration of your involvement in ICTPD Programme: Indicate the time span over which you received active ICTPD support (workshops, facilitator visits, conferences, seminars, etc) as part of the cluster programme	☐ 0-6 mths ☐ 7-12 mths ☐ 13-18 mths ☐ 19-24 mths ☐ 25-30 mths ☐ 31-36 mths
Do you have a laptop under the TELA scheme?	☐ Yes ☐ No
If yes, how long have you had a laptop under the scheme?	☐ 0-6 mths ☐ 7-12 mths ☐ 13-18 mths ☐ 19-24 mths ☐ 25-30 mths ☐ ≥31 mths

THE ICTPD CLUSTER PROFESSIONAL DEVELOPMENT PROGRAMME

1. **Please indicate your level (1-5 scale) of confidence in relation to personal and classroom use of ICTs with reference to BOTH BEFORE and AFTER taking part in the ICTPD Programme.** *Enter a rating 1,2,3,4 or 5 in EACH column. (See example)*

1= Anxious   2= Not confident   3= Neutral   4= Confident   5= Very confident

	Confidence about using ICTs	Before PD	After PD
Example	How confident were/are you about using ICTs **with your classes**	2	4
a	How confident were/are you about using ICTs **personally**?		
b	How confident were/are you about using ICTs **with your classes**?		

2. **Please indicate your level (1-5 scale) of competence with each of the following ICTs *BOTH* BEFORE and AFTER taking part in the ICTPD programme**. *Enter a rating 1,2,3,4 or 5 in EACH column*

1= Very low/None   2= Low   3= Moderate   4= High   5= Very high

	ICT	Before PD	After PD
a	Basic Computer Operation (running programmes, trouble shooting, etc.)		
b	File Management (manipulation of documents, folders, etc.)		
c	Word Processing (manipulation of text – programs such as Word)		
d	Spreadsheet (create charts/graphs, use for record keeping purposes – programs such as Excel.)		
e	Database (use pre-made databases such as library catalogue database or create own databases)		
f	Graphics (manipulation of pictures and images – programs such as KidPix, Photoshop, etc.)		
g	Internet (searching and/or website design)		
h	Telecommunications (email, chat, etc.)		
i	Presentation / Multimedia (incorporating sound, movies, etc.)		

3. Please indicate the frequency with which you used ICT BEFORE and AFTER the ICTPD programme for the two purposes below. *Enter a rating 1,2,3,4 or 5 in EACH column.*

1 = Never   2 = Rarely   3 = Sometimes   4 = Often   5= Always

	Purpose	Before PD	After PD
a	School administration e.g. reports, marks and grades, attendance etc		
b	Finding or producing resources for lessons		

4. To what extent has ICT been integrated into your units of work? *(Please answer with reference to both BEFORE and AFTER the ICTPD programme. Please enter a rating 1, 2, 3, 4, 5 in the relevant box in both columns).*

 1. No units   2. One or two units   3. Several units   4. Most units   5. All or almost all units

Extent of ICT Integration	Before PD	After PD
What proportion of your units of work contains ICT based learning activities?		

5. a) To what extent have your classroom practices changed as a result of your participation in the ICTPD programme? *(Please tick ONE box only).*

☐ Not at all   ☐ Very little   ☐ To some extent   ☐ To a large extent   ☐ Completely changed

b) Describe these changes (positive and/or negative) to your classroom practices.

_____
_____
_____
_____

6. a) To what extent has the ICTPD programme contributed to your understanding of teaching and learning generally? *(Please tick ONE box only).*

☐ Not at all
☐ Confirmed current ideas/understandings about teaching and learning
☐ Contributed some new ideas about teaching and learning
☐ Provided a whole new approach to teaching and learning

b) Describe <u>how</u> the ICTPD programme has contributed to your understanding of teaching and learning in general.

_____
_____
_____
_____

7. Describe up to 5 different ICT based activities that your students have engaged in during the last year?
Identify the subject or learning area (eg: Health, Science, integrated curriculum), the type of ICT/software you used (eg. Internet word- processor, digital camera), and the learning outcomes for students.

	Essential Learning Area	Software / ICT	Learning Outcomes for Students
	e.g. English/Languages	*e.g. Word Processor, Digital camera*	*e.g. Presenting different points of view*
	e.g. Science	*e.g. CD Rom tutorial, Spreadsheet*	*e.g. Applying Motion formulae to problems*
a			
b			
c			
d			
e			

8. How often, on average, did/do your students use ICT based activities where the following constituted the main purpose of the activity? *Please indicate a frequency of use for both the year BEFORE the ICTPD programme, and NOW in this last year. Use the 1-5 scale below*

1 = Not at all	2 = Once or twice in the year	3 = Once or twice a term
4 = Once or twice a week	5 = Daily/almost daily	

	Purpose	**Activity**	*Before PD*	*Now*
a	Communication	<u>Text and picture presentation</u>: eg. making posters, journals, written stories etc		
		<u>Multimedia presentations</u>: eg. making slideshows; blogs, podcasts, presenting results of project using PowerPoint or Hyperstudio etc		
		<u>Online interaction</u>: e.g. emailing or chatting with experts/other students on a current topic or a problem. Videoconferencing, Belonging to e-club or contributing to online communities		
b	Creativity	e.g. creative writing, designing and making websites, editing and composing music, video etc. creativity focus		
c	Information gathering/processing	e.g. accessing or searching for information on the internet, accessing school library electronic catalogue, or data logging using external devices connected to computers		
d	Problem solving	e.g. calculating/analysing data, working through simulations on computer, designing or developing their own spreadsheet or database to solve a problem; interactive fiction; immersive gaming		
e	Curriculum practice	e.g. learning from tutoring software, reinforcing pre-taught knowledge or practicing skills; drill and practice		
f	Technical skills	e.g cut and paste, file management, importing digital photographs, key board skills, how to use Inspiration		
g	Collaborative learning and social interaction	e.g. working in groups to solve a problem using spreadsheets etc, collaborating on DTP projects, multi-user gaming etc		
h	Motivation/Reward/Engagement	e.g. working on a CD Rom or game etc as a reward		

9. **To what extent to date do you think you have effectively integrated ICTs into your classroom teaching and learning?** *(Please tick ONE box only).*

☐ Not at all   ☐ Very little   ☐ To some extent   ☐ To a large extent   ☐ Completely

10. **What were the main three benefits you observed for <u>students/learners</u> in their use of ICTs?**

a)_____
b)_____
c)_____

11. **To what extent were your goals/expectations met by ICTPD programme?** *Please answer with regard to the 5 types of goals below, using the following five point scale:*

1=. Not met   2= Partially met   3= Largely met   4= Fully met   5= Exceeded

	Type of goal	Extent to which goal met
a	Technical skill development	
b	Ideas for using ICTs with classes	
c	Quality teaching and learning enhancement in general	
d.	Using ICTs for administration	
e	Gaining of Qualification	

12. **Which aspects of the last two terms of your ICTPD school cluster programme have you:**

a) **Most appreciated?**
   _____
   _____

b) **Least appreciated?**
   _____
   _____

13. a) To what extent has any increase in your use of ICTs with classes over the last three years been attributable to the ICTPD Professional Development Programme? *Please tick ONE box only*

☐ Not at all attributable   ☐ Partly attributable   ☐ Largely attributable   ☐ Completely attributable

b) **If other factors were involved, what were they?**
   _____
   _____

14. **What are your greatest current concerns about using ICTs in schools?** *Please rate each of the following as it applies to you, on a 1-3 scale*

1 = No concern   2 = Some concern   3 = Significant concern

		Rating
a	Access to equipment for my students' use	
b	Insufficient technical support	
c	Making the links between ICTs and quality teaching and learning	
d	Lack of ideas on how to use ICTs with classes	
e	Lack of time to cope with it all	

f	Need for ongoing professional development	
g	Keeping up-to-date with required skills and knowledge on ICT developments	
h	Technical reliability/equipment breakdown	
i	Others: Please specify	

15. a) How significant has the ICTPD Cluster Programme been in your overall development as a teacher?

☐ Not significant   ☐ Slightly significant   ☐ Somewhat significant   ☐ Very significant

    b) Comments:

    _____
    _____
    _____

Thank you for your participation in the ICTPD Cluster programme and for completing this evaluation.

Please seal your completed questionnaire in the envelope provided, write your name and school on the back of the envelope, and return the sealed envelope to your cluster facilitator
before Wednesday 13 September 2006

Queries or comments regarding this questionnaire should be addressed to:
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