

The provision of professional development in ICT: a New Zealand perspective

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Over the last two decades there have been significant increases in the integration of Information Communication Technologies (ICT) in New Zealand schools. Investment in infrastructure, equipment and applications has been supported by a corresponding increase in the funding for Professional Development (PD) provision for teachers in ICT. This is based on the assumption that the level of competence and confidence of teachers in ICT directly impacts on the capacity and capability of schools to positively engage their learners in ICT-supported learning environments. Influenced by the school reforms of the late 1980s (Tomorrow's Schools) a school-administered model of professional development, the ICT PD Cluster Model, was conceived by the New Zealand Ministry of Education in 1996. This model encouraged groups of schools (clusters) to reflect upon the potential impact and influence of ICTs on their learning communities. The outcome of this process, combined with schools' existing knowledge of their teachers' capabilities and confidence in ICT, influenced decisions on the focus, design, delivery and assessment of professional development activities. The dual purpose of this paper is to firstly, review the ICT PD cluster model and describe those key features that could be considered 'best practice' and secondly, identify those attributes that either enabled or impeded ICT PD Cluster implementations and the critical organisational and operational success factors which should be followed in any future model of ICT PD implementation.

Keywords: *schools, professional development, responding to change, changing environments, peer support, mlearning, Web 2.0, case study, implementation strategies*

1. Background

Information and Communication Technologies (ICTs) have become an integral part of personal, societal and working life. ICTs extend from computers in homes, offices and schools, to personal portable devices and mobile technologies to the centrally-connected systems in businesses, banking and governments (Clayton 2009). The growing prevalence of ICT has prompted concerted government action (Becta 2009). There is an underlying assumption that governments need to ensure all their citizens are comfortable with, and capable of, using the ICTs necessary for them to successfully participate in an information-rich, knowledge-based, globally-connected, digital world (Lallana 2004). The education sector is generally aware that web-browsers are growing in sophistication and complexity, matching the increasing speed and differentiation of Internet search engines. There is increased availability of educationally-focused digital resources and growing use of media-rich content. Portable and mobile devices are becoming increasingly connected. Learners are obtaining ever-advancing technological skills. The combination of these means that learning events, for the school, learner and the educator, are less likely to be confined to text and print-based materials. Opportunities are being created to use ICT resources, time, place, and space more effectively (Clayton, Elliott & Saravani 2009).

2. New Zealand context

To participate successfully in the 'information age' and increasingly globally-connected learning environments, individual New Zealand schools and successive Governments have increased their investments in ICTs (Ham, Gilmore, Kachelhoffer, Morrow, Moeau, & Wenmoth 2002). This investment in infrastructure, equipment and applications has been matched by a corresponding increase in the funding for professional development provision for teachers in ICT. This move acknowledges that the level of competence and confidence of teachers in the educational use of ICT directly impacts upon the capacity and capability of schools to positively engage their learners in ICT-supported learning environments (Becta 2009; Clayton, et al 2009).

Initially, the ICT professional development offered to New Zealand teachers followed conventional models and modes of provision. In essence, a nationally perceived need (i.e. teachers' lack of personal ICT skills) was centrally addressed. This was achieved by either, the creation of professional development activities, provided within a defined timeframe and facilitated by external experts, or, by the funding of Advisory Services to employ IT specialists to provide guidance to individual schools (Ham, et al 2002). Influenced by the school reforms of the early 1980s and the devolvement of some operational responsibilities from central agencies to self-governing Boards of Trustees, a school-focused model of professional development was introduced in 1996. This was the Information Technology Professional Development (ICT PD) initiative (ICT Strategy Reference Group 1998). The enthusiastic response by participating schools to the ICT PD initiative encouraged the Ministry of Education to refine and expand this initial scheme. The result was the establishment of a professional development model that became known as the *ICT PD Clusters Model*.

3. ICT PD Cluster Model

The ICT PD model encouraged groups of schools (clusters) to reflect upon the potential impact and influence of ICTs on their learning communities and stakeholders. This reflection aimed to assist schools in identifying why, when and how ICTs would be integrated within their current practice. This identification, coupled with schools' existing knowledge of their teachers' capabilities and confidence in ICT, would influence school decisions on the focus, design, delivery and assessment of professional development activities (Clayton, et al 2009a). Although each cluster designed their own sequence and focus of professional development activity within the cluster, the basic structure of the ICT PD model was centrally prescribed as follows (Ham, Toubat, & Williamson-Leadley, 2005):

- The programmes developed were to focus on the integration of ICTs into the professional practices of teachers.
- A 'Lead School' would take responsibility for the collaborative partnerships with other schools and for the facilitation of teacher professional development for a period of three years.
- Each lead school would administer the funding allocated and ensure it was allocated to teacher professional development and no other purpose.

The intended outcomes of the ICT PD Clusters programme were:

- Increased understanding by teachers, principals, students, and school communities of the educational benefits of ICT;
- Increased capability of teachers and principals to use ICT for their own professional learning and to use ICT to facilitate improvements in student learning and achievement;
- Strengthened professional learning communities and increased collaboration within and across schools, and
- The development of a rich resource of expertise, experience, and materials in effective ICT use at a local and national level.

It was envisaged the success of these schools would promote good practice in other schools by being "exemplars" that could be used to inform the professional practices of other schools.

4. Models of professional development: deficit and empowerment

The views held by constructivists have significantly influenced the way professional development is conceptualised and delivered (Posner, Strike, Hewson, & Gertzog 1982). The separation between knowing and doing, described by the folk categories of 'know what' and 'know how' (Brown, Collins & Duguid 1989) can no longer be sustained. A foundational premise of constructivism is the concept that knowledge is actively constructed by the participant, not passively received from the environment in which they are placed (Driver 1989). To put it simply, it appears impossible to transfer competencies and concepts of ICT in education wholesale into teachers' heads and expect these to remain intact or unaltered. Teachers' perceptions that they can, or cannot, effectively use technologies in teaching and learning will impact on their ability to integrate them in their practice (Abbitt & Klett 2007; Niess, 2006). In short, the presentation of pre-packaged ICT learning events to teachers does not necessarily mean understanding will occur.

In the initial professional development designed for New Zealand teachers, external experts delivered preconceived learning events to specifically address their understanding of the identified deficiencies in teachers' knowledge (Ham, et al 2002). This did not fully acknowledge that teachers held views of teaching and learning and ICT that would be resilient and resistant to change (Abbitt & Klett 2007; Gilbert 1993). This centrally controlled broadcasting of learning events followed what could be considered a 'deficit' model of professional development (Clayton, et al 2009a). This is representative of a training or transmission model which aims to fill perceived gaps in the teachers' knowledge of ICT and its use, rather than a reflective practice approach which enables a degree of empowerment for the teacher to decide how the professional development is planned and structured (Niess, 2006; Smylie & Conyers 1991). The deficit model, where the expert fills the perceived gaps in a teacher's knowledge, is illustrated in Figure 1 below.

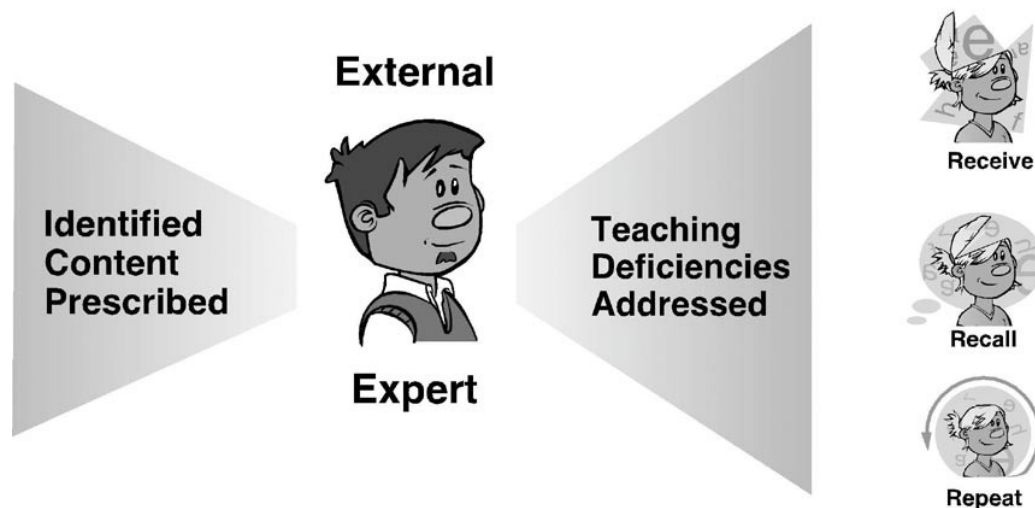


Figure 1: Deficit professional development model

The ICT PD cluster model encouraged groups of schools to reflect upon teachers' capabilities and confidence in ICT, their current practices, plus the potential impact of ICTs on their teaching and learning practices. In essence, the introduction of the ICT PD initiative shifted investment in professional development by schools and government from funding a 'deficit' approach to an 'empowerment' approach (i.e. schools' internal reflection and decision making on how, when and why ICTs could be integrated drive the creation, provision, timing and content of school-focused professional development), (Clayton, et al 2009a). This model of professional development would involve opportunities for teachers to share their expertise, co-learn with peers, and collaborate on authentic, "real-world" projects (Vrasidas & Glass 2010; Robertson, Fluck, Webb, & Loechel, 2004). This 'empowerment' approach, where teachers are encouraged to reflect on their current ICT practice, is illustrated in Figure 2.

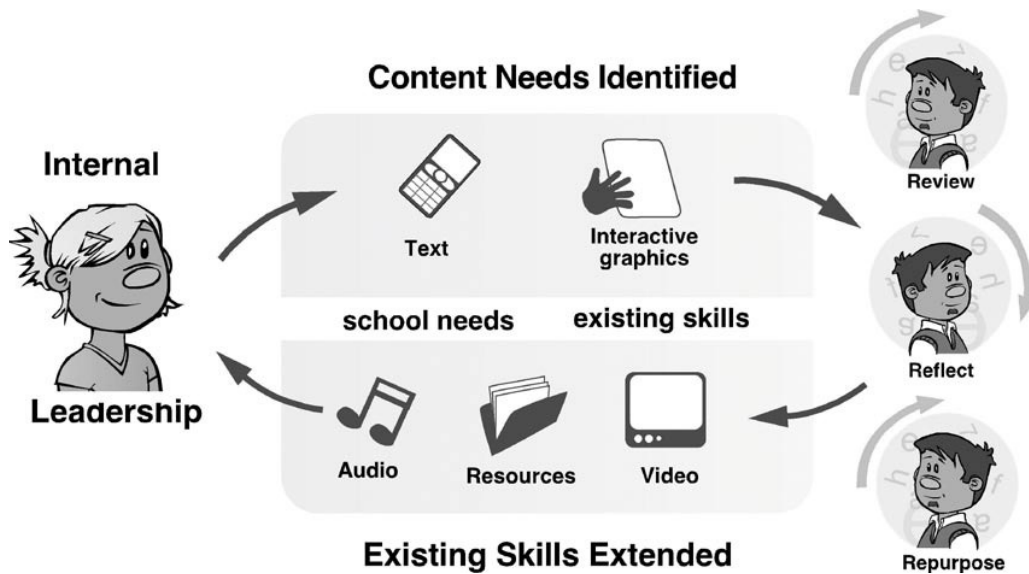


Figure 2. Empowerment model of professional development

5. National facilitation

The innovative shift from a deficit to an empowerment approach, meant that schools took ownership of the professional development process (Keller, Hixon, Bonk, & Ehman, 2008; Lawless & Pellegrino, 2007). This placed extra demands upon the school leadership. As well as undertaking their normal tasks, school leaders became responsible for the effective design and efficient delivery of school-focused professional development. This task was unanticipated when they were originally appointed to their roles. An identified risk inherent in this shift of approach was the ability of the existing leaders in schools to undertake the task of identifying and providing the appropriate professional development activities to meet the school's specific needs. In mitigating this risk, the Ministry of Education funded a national coordinator to assist school leaders to become familiar with the new tasks they faced. During the life-cycle of the project, this initial appointment was supplemented by appointments of other coordinators (Ham, et al 2005). For example, some of appointments focused on Maori, secondary, primary and/or virtual environments.

As well as providing assistance with administrative and contractual obligations national facilitation was intended to (Clayton, et al 2009):

- Aid the development of ICT strategic plans for individual schools.
- Provide guidance on cluster administrative tasks.
- Provide guidance on the likely effectiveness and efficiency of the ICT professional development being planned.
- Plan and provide activities that allow regular networking opportunities.
- Identify and disseminate 'exemplars' of good practice to inform the professional practices of other schools.
- Promote the creation of 'communities of practice' around the implementation of ICTs in teaching, learning and administration.

The national facilitation, conceptualised as a 'ripple model', is illustrated in Figure 3.

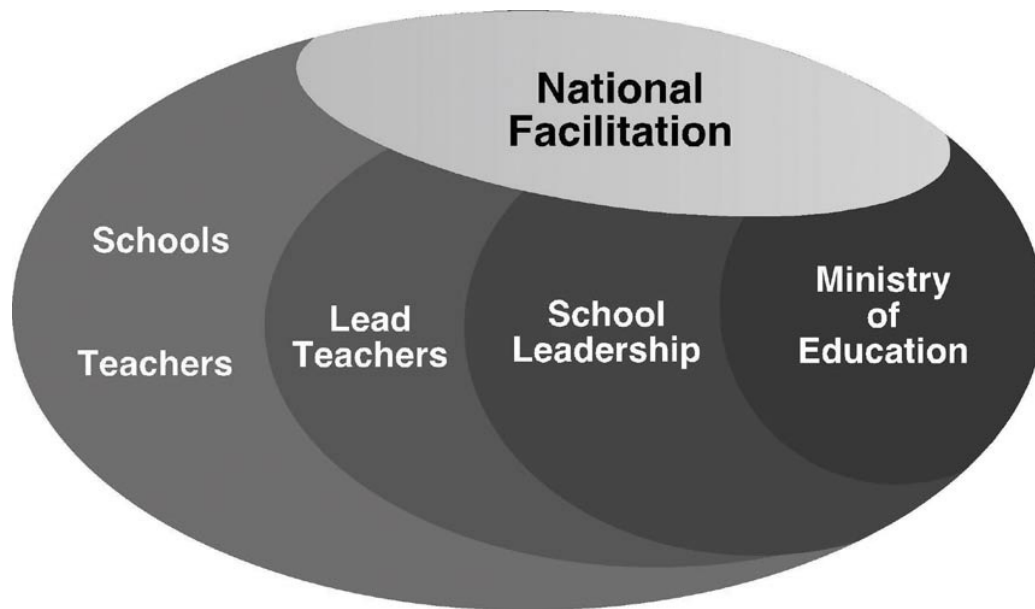


Figure 3. National Facilitation Conceptual Model

6. Impact

In 2009 a research project, *ICT PD Cluster Programme Research Review Project*, was funded by the New Zealand Ministry of Education (Clayton, et al 2009a). Two of the project's key themes were to assess, explore, identify, describe and report on:

- In what ways, and to what extent, did the provision of ICT PD increase the capabilities of teachers to use ICT effectively in their practice?
- What key features of the current model of ICT PD provision could be considered 'best international practice'?

Initially a desk-top literature review of past and current ICT PD programmes was undertaken. This involved evaluating national and international government research publications, strategic documents, academic journals and professional development web-portals focused on ICT PD. This desk-top work was supplemented by a review of ICT PD cluster reports, milestones and specific project research reports identified by the Ministry literature. In reviewing the material for the project, an 'intuitive-rational' approach was adopted. In essence, the intuitive-rational approach applied in this project involved the researchers identifying the salient themes within the material reviewed (Aldridge, Dorman, & Fraser, 2004). To reduce the bias of researcher-generated assumptions, the themes generated, conclusions drawn and recommendations offered, were submitted for peer review by other experts in the field.

The evaluations and commentaries providing a context for and/or serving to highlight the impact of the ICT PD cluster model can be classified within three broad categories;

- Commissioned Evaluations and Research: These include national trend papers (Ham, et al 2002; Ham, et al 2005), and formal project evaluations (Clayton, et al 2009).
- Associated Evaluations such as those initiated by the New Zealand Education Review Office (ERO 2005; ERO 2005a)
- Independent research: Including dissertations and theses (Rudolph 2005; Halliday 2000; Devery 2005; Ballantyne 2004).

In general, these studies indicated the basic concept of clustering for the provision of professional development through devolved funding resulted in a degree of success. Cluster participants acknowledged that the ICT PD programme enabled participating schools to achieve their goals of increasing the level of teachers' knowledge, competencies and confidence in using identified ICTs in their professional practice and school administrative tasks.

It also appeared that the National Facilitation team was able to provide appropriate 'just-in-time' advice and guidance when required. This support was directed, in many cases, at those relatively inexperienced in terms of the use of ICTs in teaching and learning, as well as cluster leaders (i.e. principals, facilitators, ICT coordinators and lead teachers). This support was intended to enable them to successfully acquire the requisite skills and experience to lead professional development initiatives for staff. It also aimed at helping the cluster leaders successfully manage and administer the full range of cluster activities.

7. Enablers, inhibitors and critical success factors

Detailed analysis of literature, national project reports prepared for the Ministry and individual school reports prepared for ICT PD clusters enabled the project team to identify those key attributes that either enabled or impeded the ICT PD Cluster model and the critical organisational and operational success factors which should be duplicated in any future model of ICT PD implementation (Clayton, et al 2009).

7.1 Enablers

- 7.1.1 *Levels of Awareness:* Successful clusters were those clusters that shared a common philosophy on the benefits of integration of ICT within their schools and were fully conscious of the demands placed upon administrators by contractual requirements of the cluster contracts; in short, they were fully prepared.
- 7.1.2 *Communication and Dissemination:* Clusters that met often and communicated regularly were able to create a sense of 'community'. Celebration of success at local, regional and national events raised the profile/standing of the facilitator and lead teachers within the cluster; within the wider school community and nationally. This recognition helped consolidate senior management support for the initiative.
- 7.1.3 *Leadership:* All participants recognised the critical role that principals and senior managers played in the success of the cluster. If cluster principals and senior managers communicated regularly with each other and fully supported the lead teachers and facilitators, the cluster was successful. If principals and senior managers took a neutral or even 'hands off' approach the cluster tensions increased and in general the cluster was not as successful as it could have been.
- 7.1.4 *Pedagogical Leadership and Focus:* It was consistently acknowledged that the acquisition of technical skills in ICTs on their own was not in and of itself an enabler of good teaching practice. The acquisition of technical skills and the resulting increased competence and confidence of teachers needed to be situated with applied examples of successful practice.
- 7.1.5 *Project Management:* Successful clusters were those that identified the potential 'risks' inherent in actions they contemplated and managed them. For example, the recognition that the increased provision of professional development on the use of interactive white-boards would drive a demand for increased investment in white-board technologies. By recognising the risk, an increased demand for investment, clusters were then able to seek extra/external funding or sponsorship or manage resource allocation differently.

7.2 Inhibitors

- 7.2.1 *Lack of specialist knowledge:* In some rural and distributed communities the specialist knowledge required to complete the contract was not available and the cost of external provision was extremely high. The issue of the impact of externally contracted facilitators not fully conversant with the schools needs, often with a roll-out focus on skills development, was consistently raised.

- 7.2.2 *Mismatch of technical infrastructure with demand-side requirements:* As professional development activities were delivered, teachers became more competent and capable in a range of applications and digital devices. As teachers then began to deploy them within their classrooms, they placed increasing demands upon the existing technical infrastructure and equipment available. Often the existing technical infrastructure was not capable of meeting the increased demand and there was a lack of available equipment.
- 7.2.3 *Lack of senior management engagement:* If individual school principals did not fully support the ICT initiatives offered within the cluster, facilitators found it very difficult to fulfil their duties effectively. Leaders (i.e. facilitators and/or lead teachers) were burdened with obstacles that were difficult to overcome and unmotivated, reluctant staff.
- 7.2.4 *Loss of key personnel:* When cluster principals, facilitators or lead teachers, for whatever reason, were unavailable to continue with the ICT PD Cluster programme, disruption occurred. National Facilitators noted it was difficult to replace key cluster personnel and cluster progress was hampered until new personnel were appointed and inducted into the cluster community.

7.3 Critical success factors: organisational

- 7.3.1 *Consistency of cluster composition:* The sector composition of clusters appears to impact upon their successful operations. The positive effects were proportionally greater within primary sector clusters than in mixed (primary-secondary) or secondary clusters. There was also a perception that secondary school teachers had fundamentally different needs and worked within different organisational structures to those of primary teachers. It would appear horizontal clusters (i.e. schools of the same sector) have a greater impact.
- 7.3.2 *Co-location:* There appeared to be consensus that schools close to each other shared a 'natural commonality' of interest. In essence, these clusters were serving the same or similar physical or cultural communities. It was also noted that localised clustering meant the provision of professional development, (i.e. the location of workshops, costs associated with travel) was more manageable. It would appear localised clusters (i.e. schools in the same geographical region) are more cost-efficient and manageable.
- 7.3.3 *Critical mass of participating teachers:* While small clusters appeared to be more able to create a sense of 'cluster community' there appeared to be no optimum number of schools to enable a cluster to be successful. Clusters with the greatest 'value added' have included anywhere between 5 and 25 schools. However, while the actual number of schools involved does not appear important, what does appear to be critical is the number of teachers engaged in cluster activity. Small (approximately 30 participants) to medium (less than 130 participants) enable a sense of community to be developed and appear to be more manageable. It would appear clusters engaging no more than 130 teachers in ICT PD activities are more able to meet the needs of participants.
- 7.3.4 *Quality of cluster facilitation:* A significant number of principals and teachers involved in the ICT PD programme recognised the quality of their cluster facilitator as being a key factor in determining its success. A facilitator appeared to need existing professional credibility, a sound knowledge of teacher education strategies and demonstrate a high degree of personal commitment to the ICT PD programme. In these cases they were able to generate a strong sense of community and significantly influence the impact of the ICT PD programme.
- 7.3.5 *Management support:* Facilitators, lead teachers and teachers all agreed that the extent of active commitment shown by principals and/or senior management personnel to the activities of the cluster was an influential factor in the impact of cluster activities on school ICT initiatives. Principals and/or senior managers needed to be able to clearly articulate the benefits of participation in the ICT PD initiative to the stakeholders of the school.
- 7.3.6 *Team owned:* Both the national facilitation team and teachers within schools agreed that clusters and schools that paid attention to the creation of a sense of ownership and community were high 'value added' clusters. The basic concept underpinning the ICT PD initiative is 'empowerment'. Professional development should be designed specifically to meet the needs of clusters and to be delivered within them. The creation of a culture of 'team ownership' of the ICT PD was critical to its ongoing success.

7.3.7 *Appropriate ICT infrastructure*: An often aired and consistent concern expressed by a significant number of cluster participants was the reliability and robustness of the technological infrastructure. These concerns were focused on two areas. Firstly, inadequate student access to required equipment. Secondly, regular ICT equipment failure and the associated lack of technical support. It is apparent that participant schools should be able to demonstrate they have, or are planning to acquire, the appropriate ICT infrastructure to support their involvement in the ICT PD programme.

7.4 **Critical success factors: operational**

7.4.1 *Structure and Content that addresses skills, practice, and knowledge*: It is recognised that teachers' professional development activities cannot be easily compartmentalised; they are interwoven and overlapping. However, there appears to be a natural association between teachers acquiring skills (are competent), and deploying these skills in their professional practice (are confident) with an underlying belief that this use of ICT is beneficial to themselves as professionals and to their students as learners (are knowledgeable). This finding suggests that, in structuring a balanced ICT PD programme, three key elements should be addressed:

- Competencies (How): Practical sessions should be offered on 'how' to competently operate various ICTs both for administrative purposes and for learners to utilise them in their learning activities.
- Deployment (When): Sessions, enhanced by authentic New Zealand examples, should be designed to show 'when' ICTs can be successfully integrated into learning activities.
- Theory (Why): Sessions, enhanced by applied research, should be structured to illustrate 'why' using ICT in classrooms and for administrative purposes is beneficial to teachers, students and schools.

Ideally programmes should be designed with an overarching focus with potentially, a longer-term effect than those offered with a single topic or narrow focus.

7.4.2 *Optimal duration of 3 years*: It is generally agreed that the time a teacher is actively involved in ICT PD activities directly correlates with the frequency of their classroom and administrative use of ICTs. It is also generally agreed that increasing teachers' familiarity and competencies in computer operations and software applications can be relatively speedily addressed. However, improving teachers' levels of confidence of using ICTs within the classroom, developing strategies and techniques to empower students to seamlessly use ICT in their learning and increasing participants' knowledge of teaching and learning theory in regard to ICT use, take significantly more time. Ideally, teachers should be actively engaged for the full three years of the ICT PD programme.

7.4.3 *Co-learning delivery mode*: The professional development provided across clusters and within schools varied from group to group. There was a mix of formal and informal, technology-facilitated and face-to-face, internally delivered and external provision and short-term and long-term contracts. All methods, in one way or another, found favour with participants. It is therefore difficult to prescribe a set recipe for delivery. However, it is noteworthy that the preferred professional development learning options, (working one-to-one with a mentor/coach/tutor; collaborating with a regular partner and working in similar sector or skill level small groups) have remained relatively consistent over the duration of the ICT PD initiative. It would appear sensible that these aspects continue to be included in future ICT PD programmes.

7.4.4 *PD recognised as part of workload*: In general, teachers preferred professional development to be integrated into their recognised teaching workload. This meant they would be "released" to undertake the scheduled learning events. If this was not always possible, a significant majority indicated they would be willing to participate in organised after-school sessions. All other suggestions on timing of events generated consistently high proportions of negative feedback. Scheduling sessions for a half-day during term breaks or for 1-2 Saturdays per year were possibly acceptable. However, all other options presented (i.e. full days during term break or 3-4 Saturdays per year) created resentment. In designing professional development events these factors could be taken into account and activities scheduled accordingly.

8. Summary

To participate successfully in increasingly globally-connected learning environments, New Zealand schools and successive Governments have increased their funding for the provision of professional development in ICTs. This increased provision clearly acknowledges the competence and confidence of teachers in the educational use of ICT impacts directly upon the capacity and capability of schools to positively engage their learners in ICT-supported learning environments. The introduction and continuation of the ICT PD Cluster initiative has shifted schools and Government investment in PD from external provision to one with an internal focus. It replaced what could be described as a 'deficit' professional development model with an 'empowerment' model. It clearly indicates the Government's preference to empower schools to take ownership of the professional development process by becoming the analysers, producers, deliverers and consumers of relevant, authentic and sustainable professional development. However, the ICT PD model places extra demands upon school leadership. An identified risk inherent in the model is the ability of the existing leaders in schools to undertake the task of identifying and providing the appropriate PD activities to meet their specific needs. In mitigating this risk, the Ministry of Education funded a national facilitation team to assist school leaders to become familiar with the new tasks they faced.

This paper has shown that there is general agreement that the effects of long-term, school-based, whole staff PD are positive. It is also apparent that the support provided by a National Facilitation coordinating body was well received. This body was able to provide appropriate 'just-in-time' advice and guidance when required. In essence the basic concept of clustering for the provision of professional development through devolved funding has resulted in a high degree of success.

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