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List of Terms and Abbreviations

    BOT   Board of Trustees

    cluster   group of adjacent schools linked for the purpose
        of ICT PD

    CORE-ED   Research organisation contracted to administer
        the ICT PD clusters
    DP   Deputy Principal

    ICT   Information and Communication Technology

    LT   lead teacher

    MOE   Ministry of Education

    PD   Professional Development

    SMT   Senior Management Team

Abstract

About half of all New Zealand primary and secondary schools have been involved in an Information Communication Technology (ICT) professional development clusters since 1999. These clusters have supported schools to integrate ICT in to the schools curriculum using a wide variety of different models of professional development. Each cluster lasts for three years and then the funding ceases. This research was based in a school that had finished a cluster in 2004 using one model of professional development, the use of lead teachers to deliver the professional development. The school, a metropolitan mid-decile secondary school, invested extra professional development into a group of teachers who were leading users and who had volunteered to take responsibility for a curriculum area in the school. The research focused on how the lead teacher model offered a sustainable model of professional development once the Ministry of Education funding had stopped.

This research was a participant case study of the lead teacher's model of professional development and employed both quantitative and qualitative research methods. Initially the school's teachers were surveyed for their computer literacy and the school's use of its computer suites was tracked. For the qualitative data the Deputy Principal responsible for professional development was interviewed along with the lead teachers. The lead teacher's meetings were observed as was a range of staff development carried out by the lead teachers.

Firstly this research discovered that most teachers were competent users of ICT for their personal and professional uses but only about half were confident about using ICTs with their students or how to integrate ICT into their curriculum area. This was especially pronounced in the senior school where almost no uses of ICTs were found, apart from a small number of specialist subject uses. It is therefore important that the ICT professional development focuses on the use of ICT for teaching and learning and lead teachers are an appropriate delivery vehicle for the professional development required.

The second part of this research looked at the sustainability of the lead teacher model for the delivery of ICT professional development. The research found a number of criteria for the lead teacher model to be sustainable. The lead teacher group needed a clear identity in the school with a visible leader, to be integrated into the ordinary administration and have a clear purpose. Finally the group needs to be regularly reviewed for all of the above.

It is important that more research is carried out into the sustainability of other models of professional development used in the clusters.

Chapter 1 – Introduction

The purpose of this chapter is to describe and introduce this thesis. I will describe the background and introduce the key research questions and the reasons that that this study is important. The thesis is presented using Perry's (1994) five chapter model of introduction, literature review, methodology, findings and discussion and conclusions.

Background to the Research

In 2002 my school entered into a three year Ministry of Education contract to fund Information Communication Technology (ICT) Professional Development (PD) with a cluster of three other local secondary schools. This contract, "the cluster", provided funds for a centrally co-ordinated facilitator external from all the schools, to provide professional development to the schools. During the three years of the cluster I was involved as link between the cluster facilitator and the school. With support of the facilitator I helped to establish a group of lead teachers, as described by Halliday (2001), for the ICT PD programme. The lead teacher model of professional development was used during the three year period of the cluster funding. In this model the lead teachers were drawn from a cross-section of the school on a volunteer basis and given extra professional development. The lead teachers then worked with a department or group within the school to help in the curriculum integration of ICT. The funding for this ICT PD project stopped at the end of 2004.

The lead teacher model of professional development facilitated the integration of ICT into the school's curriculum. The use of the school's ICT resources has increased considerably and many teachers had become enthusiastic ICT users in their curriculum areas as evidenced by the increased demand on the school's ICT resources. The model of lead teachers providing the professional development in ICT appeared to be successful during the time of the cluster. More importantly the lead teacher model seemed to offer a sustainable model of ICT professional development in terms of the school's resources after the Ministry funding from the cluster finished.

This research project was based in my school, a mid-decile central city suburban high school with a roll of about nine hundred students of a wide range of ethnicities. The school was in a growth phase having increased its roll approximately one hundred and fifty students in both 2004 and 2005. This meant that the school had employed a number of new teachers in both years. This school was chosen because it had completed a Ministry funded cluster in 2004 and was continuing with the lead teacher model of professional development for the duration of this study.

The following factors have facilitated this project. Firstly this school had a Senior Management Team who were open to trialling new ideas and supportive of research in the school. Secondly the lead teacher group of 6 teachers, including the researcher, was already established and had been a stable group for the three years of the cluster funding. These two factors made the school an ideal environment to test a model such as the lead

teacher model and arrive at some generalisations about the successes and sustainability of the model.

During the cluster there was a large component external to the school structures, consisting of an external cluster facilitator and the support of UNITEC in Schools. This external component to the school's structures was funded by the Ministry of Education (MOE) and that funding ended in December 2004. Fullan (1991) describes how this external funding can be helpful in the initial establishment of new initiatives but further warns that the larger this external support, the less likely that the project continues after the funding is removed. The effect of this external funding is further expanded in the literature review. This issue, how to continue with ICT PD in a sustainable manner after the Ministry funding had ceased, led to this research.

The Research

This research had two main parts. These were firstly the lead teacher (LT) model of ICT professional development.

This research described and examined the practices of the lead teachers as they helped classroom teachers integrate ICT into their usual classroom teaching practices. The aim of this part of the research was to examine the impact of the model of lead teachers in delivering ICT professional development.

Secondly the research focused on the issue of the sustainability of the ICT professional development in the school. The issues of sustainability were

investigated and the process of sustaining the continued ICT professional development are discussed. The research investigated how the lead teacher model of ICT PD was sustained in the year after the cluster funding had ended. It was intended that this research would point out a sustainable model for continued ICT professional development by examining the details of the model as used in one secondary school.

From the above details the key research questions emerged.

1. What roles and practices did the LT have within the cluster model?

2. What roles and practices did the LT have in the year after the cluster funding ended?

3. What were the factors that helped or hindered the sustainability of effective ICT professional development in the year after cluster funding ended?

Conclusion

This chapter has laid the foundations and described the structure for the thesis. The background for the research has been explained, the research problem has been introduced and the key research questions have been given.

Following this introduction is Chapter 2, the literature review, where the literature that describes the development of the ICT professional development clusters is introduced and professional development in the context of ICT is

described. The writing about teams is used to provide the basis for the lead teachers and the concept of sustainability is explored.

In Chapter 3, the Methodology and Data Collection explains the methods used to conduct this research and are justified using the literature of educational research.

The Findings, Chapter 4, introduces the data collected during this research and explains the significance of that data.

Finally Chapter 5, Discussions and Conclusions outlines the findings of this research and discusses the significance of this research.

Chapter 2 - Literature Review

The intention of this chapter is to explore the key literature relevant to this thesis. The background that gave rise to the government funding of the cluster and the intent of that financial support are discussed. A definition of professional development appropriate for use with information communication technology (ICT) is developed and how that professional development and the use of ICTs in schools can change the practice of teaching and learning is explored. The literature base for the model of lead teachers used in this thesis is described and related to the lead teacher group in the study school. Finally the concept of sustainability is introduced and explained.

Background to ICT Professional Development (ICT PD)

It is necessary to describe a brief history of the ICT professional development in New Zealand schools to establish the background to this research. This history illustrates the changing approaches to ICT professional development as ICTs become part of the school environment.

In the 1980s a number of schools had spent large amounts of money on the new computer based ICTs. This investment had been driven by the public perception that that literacy in ICTs was necessary in the coming age of information. Levin and Riffel (1997) also suggest that this drive to equip schools with ICTs was often explained as "preparing students for tomorrow's worlds" (p.111) and that it was considered necessary if students were to be employable. However, as Cuban (1999) pointed out, many of these

computers lay under utilised in schools as teachers had little skill in their use or application to student learning.

During the 1990s Ham (2005) recalled that the Ministry of Education started a programme of teacher professional development in ICT as a response to the *1990 Report of the Consultative Committee on Information Technology in the School Curriculum*, known as the Sallis Report. The programmes were contracted to consultants usually based in colleges of education or universities. The model of delivery was usually "expert consultant" (p.53) or "advisory" (p.53) and the content was centrally dictated for groups of teachers with a defined time of between six months and one year. At the same time the Ministry of Education continued to fund advisory services around the country to employ IT advisors, whose services were available at no cost to the schools. There was also a growth in teacher enrolments in courses in educational computing leading to diplomas and degrees from universities and colleges of education. Ham (2005) describes this varied approach a "shotgun model" (p.53) providing a variety of modes of professional development.

Establishing the Cluster

Both Selby and Ryba (1999) and Ham (2005) argue that by the late 1990s the Ministry of Education was responding to the business based lobby groups and looking for more direct school ownership of their teacher development programmes. Initially this came in 1996 with schools able to bid for contestable professional development funding. Then the Ministry released its new national ICT strategy, *Interactive Education: An Information and*

Communication Technologies Strategy for Schools (Ministry of Education, 1998). Ham comments that for the first time in New Zealand education there was a national policy statement that gave a general vision or mission for ICT. Selby describes how this document had twin aims of increasing schools' access to ICTs through a series of structural initiatives and providing new professional development opportunities for both principals and teachers.

In the 1998 budget, the government announced funding to put in place the professional development vision described in the *Interactive Education: An Information and Communication Technologies Strategy for Schools* (1998) by creating a programme of devolved and contestable funding for professional development. This initiative became known as the "ICT PD Clusters" programme, which, in 1999 started with twenty three clusters. Ham listed four ways in which the cluster programme differed from the professional development in ICT of the previous decade:

- The funding was direct to the schools which would act as both the "producers and consumers" of their own professional development programmes rather than from the traditional providers, universities, colleges of education and advisory services;

- The programmes were only available to groups of schools "clustered" together for the benefit of all the teachers in the participating schools;

- The programmes were to last for three years, previously the custom had been for one year programmes. This was an important difference as many writers (Fullan (1991), Moersh (2002), Hargreaves (2003) and

McKenzie (1998)) had pointed out that educational change of practice could not be hurried but took time to implement; and

- There was no mandated delivery for the professional development, each cluster was to develop and implement their own professional development programme. Previously most professional development initiatives had been a variation on a predetermined, Ministry approved model.

The cluster model was well funded (Ham, 2005); $100,000 per annum was supplied to the central school. The funding was only to be used for teacher professional development and could not be used to defray hardware, software or any infrastructural costs. In 1999 the first 23 clusters began their professional development programmes that they had each designed to meet their needs.

As each cluster was to design its own model for professional development it was now necessary to develop an understanding of what was meant by professional development and explain the model of professional development used in this study.

Professional Development

A number of writers such as Bolam (2002), McKenzie (1998), Terehoff (2002) and Salpeter (2003) identify professional development as the basic building block in a school for continued improvement. Pratt, Lai and Munro (2001) agree, adding that all teachers should during their careers, undertake some form of professional development. The New Zealand document *Interactive Education: An Information and Communication Technologies Strategy for Schools* (Ministry of Education, 1998) also recognises that the professional development is a fundamental requirement for change to occur and makes professional development one of its main focuses. With these writers suggesting that the role of professional development is so central to school improvement it is necessary to describe what is meant by professional development.

Fullan and Mascall (2000) define professional development as "the sum total of learning through formal and informal experiences". This definition is so broad it contributes little to understanding what professional development is. This confusion is further fuelled by Harrison (2003) who argues that there are no fixed definitions of professional development. However, a number of descriptions, rather than definitions of professional development, occur in the literature, these descriptions depend on the context. Bolam (2002) offers a working description that is presented as a set of bullet points. This list includes all the parts usually considered professional development stating that professional development is:

- An ongoing process of education, training, learning and support activities;

- Taking place in either external or work-based settings;

- Proactively engaged in by qualified, professional teachers, headteachers and other school leaders;

- Aimed primarily at promoting learning and development of their professional knowledge, skills and values;

- To help teachers to decide on and implement value changes in their teaching and leadership behaviour;

- So that teachers can educate their students more effectively; and

- Thus achieving an agreed balance between individual, school and national needs.

Although Bolam (2002) acknowledges that this definition has some problems, it does offer a useful list of the parts that can be applied to professional development in ICT.

The New Zealand Ministry of Education *Curriculum Update He Korero Marautanga* (2002) states that to succeed professional development needs to be "based on a good understanding of what makes professional development work and take account of how teachers learn" (p.4). Having established a working list of what professional development is, it is necessary to examine what has been acknowledged as successful professional development practice and to look at the requirements for ICT professional development.

Effective Professional Development

When designing a professional development program in ICT, McKenzie (1998) points out that it is necessary to clarify the purpose of this professional development about to be undertaken. He offered a series of steps that he calls "professional development that works" that encourages teachers to accept ICT as one of their tools for teaching and learning. In particular he advocates spending on human infrastructure as does Hargreaves and Fink (2003) if there is going to be any lasting change or improvement produced in a school.

McKenzie (1998) describes a process for successful professional development as a series of ten lessons. He indicates that "there are no free lunches", emphasising that time and money is necessary to develop teachers' ICT skills so that they can integrate ICT into the learning programmes of the school. McKenzie's ten lessons are:

Lesson One – Spend 10-25% of the Technology Budget on staff learning to provide 15-16 hours of professional development for each staff member.

Lesson Two - Clarify Purpose, problem solve and make decisions so that the professional development is worthwhile.

Lesson Three - Adult Learning, use an approach appropriate for adults to learn by

Lesson Four - Designate Student Learning as the Cause.

Lesson Five – Address the Emotional Dimension, make the learning safe to support the teachers in their learning of ICT skills.

Lesson Six – Create Teams and a Culture of "Just in Time support", to create a culture of learning and mutual support among the staff.

Lesson Seven – Use Surveys and Assessment Guide Planning, so that the professional development meets the needs of the teachers.

Lesson Eight – Invention and Lesson Development, when "staff invent" then powerful learning occurs.

Lesson Nine – Hook the Passions of ALL Teachers to draw the staff in and seek their engagement with the professional development.

Lesson Ten – Persist, The journey will take time so it is important to persist with the programme of professional development.

The ten lessons (McKenzie 1998) provide a vision of professional development that uses the ICTs in a new manner. The focus of the professional development is always on the students' learning but delivering the professional development in a manner that the teachers are comfortable with.

When there is pressure on schools to implement ICT programmes Moersch (2002) warns of top down professional development being prescribed for schools. When the professional development is prescribed in a top down manner then there is the danger that the professional development becomes one off training for specific applications. The ICT integration becomes "the swapping of ICT with the existing technologies, blackboard, OHP etc" (p.35). Moersch argues that the professional development should be an intervention designed to reduce the emphasis on the

applications of ICT and focus on instructional design and complex thinking skills. Moersch adds that ICT "can serve as a catalyst for changing classroom pedagogy from a teacher-centred to a learner-centred environment" (p.44).

Both McKenzie (1998) and Moersh (2002) have argued that effective ICT professional development is a process that focuses on pedagogy. Ham (2005) describes this pedagogical approach as using ICTs as a Trojan Horse for introducing student centred learning.

When the study school was part of the ICT PD cluster it adapted a professional development delivery model using lead teachers. Ham, Gillmore, Kachelhoffer, Morrow, Moeau and Wenmoth al (2002) called this model a "trickle down model" (p12). The lead teachers were a team within the structure of the school. The following section looks at the literature that surrounds the formation and roles of teams and the factors necessary for a team to perform effectively.

Teams

For the lead teacher model of professional development to work it is necessary to have some understanding of teams, the lead teachers are a team within the school. Cardno (2002, p212) indicates that teams in schools are "linked to the application of collaborative management ideals" and suggests that the presence of teams in a school are a feature of collegiality. Further Cardno (2002) argues that schools are becoming an increasingly complex in the current environment of educational reform and indicates that teams are an important feature of school organisation allowing the devolution of decision making and the sharing of tasks.

A number of educational writers, Crow and Pounder (2002) and Fullan (2002), while discussing teams refer to the Hackman and Oldham's (1980) model of effective teams. Crow and Pounder (2002) describe the Hackman and Oldham model as having three main parts (p. 218).

> …effective work groups are these (a) whose output "meets or exceeds organisational standards of quantity and quality", (b) whose "members' needs are more satisfied than frustrated" and (c) "whose social process maintains or enhances the capability of members to work together on subsequent tasks"- that is, the group that doesn't "burn itself up".

Hackman in a more recent interview with Powell (Hackman & Powell, 2004) simplified his model into three key conditions that would increase the likelihood of a team being successful. He firstly suggested that the team needs to be a "real team" (p. 85), a clearly bounded or defined group with a collective responsibility for an outcome. Secondly Hackman suggests that the team needs to have "norms of conduct" that are understood by all the

team members. These "norms of conduct" can be established by either the team leader or the person who created the team. Finally that the collective team performance are recognised rather than individual successes. Hackman argues that if these key conditions are in place then the conditions for a successful team that can act as a "truly self managed performing unit". He continues and adds the optimum team size is six members and that this needs to be taken into account when designing a team.

Thus the Hackman's model of a team can be used to describe the team of lead teachers used to deliver ICT professional development. They are a team with defined task and a role to play in the school. The role of the lead teachers and their delivery of professional development is now described in detail.

Lead Teachers

Many writers, Hargreaves and Fink (2003), Selby and Ryba (1999), Ryba and Anderson (1993) and Halliday (2001) identify similar characteristics for successful programmes of professional development using consultants or mentors to deliver the professional development to teachers. Halliday (2001) in introducing her concept of lead teachers to provide the ICT professional development in schools comments:

> The challenge is to design an ICT professional development programme for a large secondary school, taking into account the needs of different curriculum areas and the variety of skill levels across a large number of teachers (p.3).

Ham et al (2003) describes using lead teachers as a "trickle down" (p. 12) model of professional development where an investment of professional development is made in a few key teachers, the lead teachers. These lead teachers then work, both formally and informally, to help provide professional development for other members of the schools staff. Ogden and Harvey (2004) describe using the lead teacher model in their cluster where the lead teachers would "work with classroom teachers on ICT related professional development" (p. 3). The focus of the lead teachers was "to make ICT an integral part of teaching and learning in the schools" (p. 3) of the cluster they were working with. The lead teachers were described as "coaches" (p. 4) who had a support role with the schools teachers. Once the lead teachers had developed the teachers they were working with to a level of confidence they could disengage to work with different teachers.

Halliday (2001) offers a similar model for the whole school ICT professional development for the environment of a large secondary school that maintains a curriculum focus, identifies the different needs of teachers and is practical. In Halliday's model there are two essential parts. Firstly, the professional development happens in workshops set in a curriculum context. The workshops combine pedagogical knowledge with technical skills to demonstrate how ICT can be used in that workshop's curriculum area. The second part of Halliday's model is the use of "lead teachers", these are teachers who help lead the professional development with the long term aim of taking over the professional development.

Halliday (2001) argues that the lead teachers should be a self selected group of ten or less that cover a range of curriculum areas. The lead teachers attend extra training where the pedagogical aspects of ICT assisted learning are addressed and their own ICT related skills are enhanced. Halliday (2001) adds that the lead teachers take responsibility for a group usually based on a curriculum area but not necessarily so. Initially the main task of the lead teachers is to support and assist other teachers. Halliday notes that it is important that all the schools teachers' are included in one of these teams. She suggests that that once this lead teacher model is established then the professional development facilitator should be able to withdraw and the lead teachers maintain the professional development.

While Ogden and Harvey (2004) describe a similar model to Halliday (2001), using lead teachers for professional development they differ in the selection of the lead teachers. Ogden and Harvey suggest that the lead teachers be selected by the school's management as teachers who are good users of ICT and have the confidence of the staff of their school. This point of difference is picked up in the chapter that describes the findings of this study.

This study is about using lead teachers to deliver the professional development in a manner that is sustainable. Both Halliday (2001) and Ogden and Harvey (2004) suggest that an advantage of using lead teachers is that the sustaining of the professional development is easier as the structures for professional development are already in place. The following section defines sustainability and the factors that the literature suggests affect sustainability.

Sustainability

One of the three main research questions in this thesis is what are the factors that helped or hindered the sustaining of effective ICTPD in the year after the cluster? To explore how ICT PD was sustained after the cluster it is necessary to define what is meant by sustainability. The term sustainability is mentioned by Senge, Cambron-McCabe, Lucas, Smith, Dutton, and Kleiner. (2000) when describing the process of educational change without defining what is meant. However they do note that sustaining change is more difficult in schools than businesses. Fullan (1991) writes that the term sustainability has developed from the earlier use of the term continuation, where continuation was used to imply that the implemented change continues. Fullan (1991) calls continuation the third phase in a planned change process.

Fullan (1991) suggests that one of the biggest hurdles in change of practice is the decision to implement change. He then considers the continuation of a change that has been implemented and suggests the decision to continue with any project is a similar process to the original implementation decisions. This means that the decision to discontinue may be taken. Berman and McLauglins (1977) are cited by Fullan (1991) offering a cautionary note that the meaning of continuation can be misleading. Firstly if many teachers have already implemented or assimilated that change into their practice but the school had decided to discontinue the project then the change has continued. Conversely the school may choose to continue with a project but the teachers not implement that change. It appears that the change has continued but the reality is different as teachers have not changed their practice.

Fullan (1991) identifies external funding, such as that available for the ICT clusters as an important factor that can adversely affect continuity. External funding is often useful for the initial implementation of change but when the funding stops the school needs to incorporate the cost into its own budget. Fullan (1991, p. 89) further adds "the larger the external resource support the less likely the effort will be continued after the external funds terminate", because of the difficulty in incorporating the costs into the regular budget. For this thesis the impact of funding on continuity of ICT PD would appear to be large, the original project, the "cluster", was well funded and included the employment of a facilitator to implement the changes.

A number of writers, Fullan (1991) and Hargreaves and Fink (2003) all suggest that the continuation of any innovation or change project depends on whether the change gets "embedded or built into the structure" (p.695) of the school. These writers call this "institutionalisation" (p.695), the change has become part of the structure of the school through policy, budget, timetable, curriculum statements and personnel assignment. Hargreaves and Fink (2003) further describe institutionalisation "when new practices are integrated effortlessly into teachers' repertoires and can affect many teachers, not just a few" (p. 695). In this way changes that have been institutionalised over time to become part of the "grammar of schooling" (p.695).

In the face of this traditional grammar of schooling, the vast majority of educational change that deepens learning and allows everyone to benefit from it neither spreads or lasts. The long standing problem of institutionalisation is now coming to be understood as the even more complex problem of sustainability (p. 16).

Hargreaves and Fink (2003) have introduced the concept of sustainability. They argue that sustainability is more than persistence over time and that equating sustainability with maintainability or continuity simply trivialises sustainability:

Sustainability does not simply mean whether something can last. It addresses how particular initiatives can be developed without compromising the development of others in the surrounding environment, now and in the future" (p. 694).

Hargreaves and Fink (2003) expand on this concept of sustainability and suggest that this definition implies three things. Firstly that "sustainable improvement is enduring" (p.694), the changes last. It requires committed relationships and is change "for keeps and for good" (p.694). Sustainable improvement therefore contributes to the "growth and good" (p.694) of everyone. Hargreaves and Fink argue that these ideas mean that sustainable improvement does not promote model or magnet schools and the change is for everyone, not the benefit of a few especially to the detriment of the rest.

Secondly that sustainability "requires that the improvement draws on resources and support at a rate that can match the rate of change" (p.695). It is important that the improvement not draw on the resources needed by others and that the money is not spent on resources or assets which are unable to be supported in the long term. They continue to suggest that

sustainable improvement requires investing in long term capacity such as development of teachers' skills which will last long after the project has finished.

Finally Hargreaves and Fink (2003) suggest that sustainable improvement stimulates continuing improvement on a broad front. It is change that can allow people to "adapt and prosper" in an increasingly diverse and complex environment. Hargreaves and Fink (2003) summarise their views:

> In education it matters that what is sustained is what, in terms of teaching and learning, is itself sustaining. To sustain is to keep alive; sustenance is nourishment. And in education, good teaching and learning that matter and last for life are inherently sustaining processes. Supporting and maintaining those aspects of teaching and learning that are deep and that foster sophisticated understanding and lifelong learning define the core of sustainable education (pp.694-695).

Over time as many and varied education reforms are implemented sustaining these changes that have improved student learning will lead to a diversity in the school environment where different practices co-exist. Hargreaves and Fink (2003) suggest that this increasing diversity is important for the vitality of schools and liken it to a rain forest, a richer and stable environment because of its diversity.

Conclusion

This study was about how the lead teachers could sustain effective professional development. The key writers and what they have to say in the area of professional development, building teams and the sustainability of changes have been introduced and their ideas explained in relationship to this study.

Chapter 3 – Methodology and Data Collection Methods

The purpose of this chapter is firstly to describe and justify the methodology and methods used in this study, being a case study of a narrative type using a participant observer (Cohen, Manion & Morrison, 2000; Yin, 2003). Secondly the methods of data collection are described and the nature of that data, qualitative and quantitative explained. Finally the processes used to interpret the data are explained.

Research Questions

The following questions guided this research:

1. What roles and practices did the lead teachers have within the cluster model?

2. What roles and practices did the lead teachers have in the year after the cluster?

3. What are the factors that helped or hindered the sustaining of effective ICT professional development in the year after the cluster?

Quantitative and Qualitative Research Methods

Quantitative Research

Quantitative research can be thought of as "hard" (Davidson & Tolich, 1999, p.19) and can provide unassailable truths as it explores relationships between the variables and significance of those relationships. Cohen, Manion and Morrison (2000) place quantitative data in the positivism paradigm.

Davidson and Tolich (1999) comment that positivism emerged from the ability of the sciences, especially physics, to explain phenomenon and solve problems. Positivist methods are concerned with observable phenomena which are used to create "law-like relationships" (p. 27) in an objective and neutral approach.

It is the positivist or scientific concern for control that has reduced the significance of individual choice, an important part of any research involving humans. Cohen, Manion and Morrison (2000) explain how quantitative data "neglects the hermeneutic, ascetic, critical, moral, creative and other forms of knowledge" (p. 19). To allow for this individual difference this study relied more heavily on qualitative research methods however quantitative research was used to describe the setting for the study and draw some conclusions about the current use of ICT in the study school.

Qualitative Research

Qualitative research "reflects on the quality of something" (Davidson & Tolich, 1999, p.19). Qualitative research records individuals' own theories and what meaning and value they have placed in the context of the research they are part of. Davidson and Tolich (1999) add that qualitative data lies in the interpretive paradigm. Neuman (1997) defines the interpretive paradigm as follows:

> The interpretative approach is the systematic analysis of socially meaningful actions through detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds (p. 68).

In summary Davidson and Tolich (1999) argue that the "strength of qualitative research lies in its validity" (p. 34). They explain that qualitative research accurately collects the opinions and actions of the participants in the study even though qualitative research may not be generalised to other locations.

This research used qualitative research to construct meaning from the research context, a case study. Cohen, Manion and Morrison (2000) argue that qualitative research is particularly valuable when the researcher is focused "on individual actors or groups of actors and seek to understand their perceptions of events" (p. 182) such as in a case study, as this research was. The qualitative research methods used included a number of interviews with the lead teachers and a number of observations of lead teacher meetings and observations of professional development.

Case Study

Yin (2003) suggests that a case study can be defined in parts. Firstly that a case study is an empirical inquiry used when the researcher wants to cover contextual conditions, "believing that they might be highly pertinent to the phenomenon of the study" (p.13). Yin explains that the boundary between the context and phenomenon may not be clearly evident and this is different from an experiment where the context is controlled to allow the study of the phenomenon. Because the context and phenomena "are not always distinguishable in real-life situations" (p.13) this leads Yin (2003) to the second part of his definition. He argues that there are many more variables of interest than the data points, which results in relying on multiple sources of

data. Cohen, Manion and Morrison (2000) further emphasise the multiple data sources noting that the data includes both the interpretive and subjective dimensions. Yin (2003) argues that the data needs "to converge in a triangulating fashion" (p.14). Finally he suggests that a case study "benefits from the prior development of a theoretical proposition to guide the data collection and analysis" (p.14). Yin concludes that a case study offers a research method that covers all aspects of the research, design, data collection and data analysis.

Thus using Yin's (2003) description of a case study, the school in which this research is conducted is the context and the lead teachers' delivery of the professional development is the phenomenon to be studied. Finally Creswell (2002, p.485) offers a description of a case study stating that a case study is an "in-depth exploration of a bounded system", where he suggests that bounded means some form of separation of the case. For this study the bounded system is the school, a separate context from the general environment for the research to take place in.

Cohen, Manion and Morrison (2000 p.181) quote a Nisbet and Watt remark that "the whole is more the sum of its parts". This suggests that a research approach that describes the parts but tries to link and understand the context of those descriptions is required. Thus, as this study was to describe the role and actions of the lead teachers and make some subjective judgements about how effectively they have delivered ICT PD in the study school, a case study seems appropriate.

Having established that a case study was an appropriate method for this research it is necessary to detail the type of case study that was used. Yin (2003) uses different types of outcome to identify three groups of case study. Firstly he defines "exploratory" used as a pilot before further research or to identify hypothesis. Secondly he uses the term "descriptive" for a case study which uses a narrative approach to tell its story. Finally he identifies "explanatory" to test hypotheses or to judge situations. Because this research is about the a group called the lead teachers and their practices in the school to assist the professional development of ICT among the staff, it was decided to use the descriptive approach to a case study. By using a descriptive case study the progress of the lead teacher group could be tracked as a narrative as the year unfolds.

Cohen, Manion and Morrison (2000) explain that a narrative method is often used in biographical research where it emphasises the interplay between interviewer and interviewee actively constructing a life history. Yin (2003) adds that a narrative allows the researcher "to compose open ended answers to the questions" (p.103) that may allude to the connection of "specific pieces of evidence and various issues in the case study" (p.104). Finally Czarniawska (2004) points out that a narrative is a valid "mode of knowing" (p.6) in a post modern society where a narrative leaves open the nature of connections, unlike the situation in a positivist or scientific paradigm. In this case - the story of the group of lead teachers and how they delivered ICT professional development, the narrative style offered the chance to explore

the operation of the group and the actions and thoughts of individual members of the group as the research unfolded over time (Cohen, Manion and Morrison, 2000 and Yin, 2003).

It is necessary to explore the role of the participant observer in a case study, as happened in this research. In any case study the "purpose of the observation is to probe deeply and analyse intensively the multifarious phenomena" (Cohen, Manion & Morrison, 2000, p.185) that make up the case being studied. Both Yin (2003) and Cohen, Manion and Morrison (2000) comment that participant observation allows for a greater depth of understanding of the motivations and actions of the group being studied. Yin (2003) adds that participant observers provide unique and unusual opportunities in collecting data. Participants may have better access to data and "be able to perceive reality from the view point of someone inside the case study rather than external to it" (p.94). Yin (2003) continues adding that participant observers may have the advantage of being able to manipulate minor events, such as convening a meeting. While this is not a precise manipulation such as an experiment it can produce a greater variety in the data collected. Thus a participant observer can give fine grained detail to the case.

However when using a participant observer to collect data it is necessary to be aware of the limitations of this model described by Yin (2003) and Cohen, Manion and Morrison (2000) and act to minimise them. Firstly the participant observer may at times need to take a position or advocacy role at times.

Secondly Yin (2003) points out that the participant observer may become a supporter of the group being studied and finally the participant role may take too much attention and not take insufficient notes or observations. These factors will be addressed in the Findings chapter.

Finally in summary this research is a case study of a narrative type using a participant-observer to compile the data for the research.

Data Collection

Yin (2003) advises that the strength of case studies is the ability to use many different sources of evidence. The advantage of the use of multiple sources of evidence "is the development of converging lines of inquiry, the process of triangulation" (p.98). Davidson and Tolich (1999) describe triangulation as the use of different methods, sources and methods of analysis to generate a variety of evidence that leads to a single consistent interpretation. In this research both quantitative and qualitative research methods were used. This section will explain the different types of data, describe the processes used to collect data and the methods used to analyse that data.

In this study there are two points that have involved the collection of quantitative data, firstly a survey of the school's staff to explore their computer literacy or skill levels. Secondly the use of the school's computer suites was recorded from the room booking records to discover who was using the suites and what they were doing. In these surveys the data consisted of quantities, or contains measured values, the variables in the research have been

translated into numbers (Davidson & Tolich, 1999), the essence of quantitative data. The design and conduct of these surveys is described later in this chapter under the heading surveys.

Interviews

The use of interviews can be thought of as an exchange of views by the conversation between individuals on "a topic of common interest" (Cohen, Manion & Morrison, 2000, p.267). Thus an interview values data from individuals and allows the participants "to discuss their interpretations of the world in which they live" (p.267). While Cohen, Manion and Morrison (2000) indicate that interviews can also be used to extract quantitative data by standardising the questions and the process of interviewing, that was not done in this research. Because the interview subjects knew the interviewer the discussions that the interviews generated provided a wide range of valuable qualitative data. The sample size used for the interviews was too small for any meaningful quantitative data to be collected. However all interviews were carefully planned and a prepared standard set of questions was used for each interview to make later analysis easier.

Because all the data collected from the interviews needed to be comparable it was necessary to prepare a set of questions that were used as a script for the interview. The script of questions used is contained in Appendix 1 to 3. This would ensure that all the participants were asked the same questions in the same order.

> Respondents answer the same questions, thus increasing the comparability of responses; data are complete for each person on the

topics addresses in the interview. Reduces interviewer effects and bias …Facilitates organisation and analysis of the data (Cohen, Manion & Morrison, 2000, p.271).

Cohen, Manion and Morrison (2000) state the advantages of this type of interview which they call a "standardised open-ended interview" (p.271).

Cohen, Manion and Morrison (2000) suggest that the disadvantages of the "standardised open ended interviews" are that the standardised wording of the questions may "constrain and limit naturalness and relevance of questions and answers" (p.271). However Yin (2003) points out that "most commonly case study interviews are of an open ended nature". The interviewees may offer their own insights and opinions as well as the facts to any question. By allowing the interviewees to expand on each of their answers to the questions, a natural product of a case study, the researcher considered that the inflexibility Cohen, Manion and Morrison (2000) described would be minimised.

Davidson and Tolich (1999) explain that an interview can be divided into three parts, which they list as:

1. introductory questions to start the informant talking.

2. a list of recurrent themes that represent the project's research interests

3. a set of generic prompts (such as "How?", "Tell me more", etc). (p148)

In this research the introductory questions were open-ended and designed to avoid one word answers. These questions were to get the interviewees to start "talking about their world" (Davidson and Tolich, 1999, p.148), in other

words to tell their story. To help with the flow of the interview and to avoid the interview starting in a staccato manner there were few of these introductory questions. While there were few questions it was hoped that they would start the interviewee talking and avoid the interviewer talking much and so introduce their bias. These attempted to be "huge questions to get people talking about their experiences" (Davidson & Tolich, 1999, p.151). Once the interviewees started talking it was considered important to keep them talking and for the interviewer to be aware of the broader themes of the research as the interviewer introduced them (Davidson & Tolich, 1999).

Using the Davidson and Tolich (1999) guide to interview structure the second part of the interview should be the main themes of the study, and the questions written as a "check list of themes" (p151). The two themes explored with the interviewees in this research, were their understanding of the tasks of the lead teachers and their professional development. Davidson and Tolich (1999) note that the interviewer should attempt to focus this part of the interview on any themes that were not picked up in the first part of the interview to ensure that all themes are sufficiently covered. The use of prompts Davidson and Tolich (1999) consider being the third part of the interview and are "spontaneous questions that seek more information or clarification" (p. 151). They add that the careful use of prompts will allow the interviewees to "open their world to you" (p 151) and that the interviewer can construct a rich texture that relates to the interviewees' experiences.

Davidson and Tolich (1999) argue that the questions can be written as an interview guide on one page (Appendix 3) so that the researcher listens more than asks questions. They add that the key to asking questions that find good qualitative data is to get the interviewees talking about the themes of the research and by prompting the interviewees to emphasise the key points that they bring out.

All the interviews were recorded and later transcribed by the researcher. During the transcription the names were given a code known only to the researcher to help maintain the confidentiality of the participants. The participants were offered the opportunity to read the transcripts of their interview and comment on anything that arose from that interview. Interestingly only one participant took this opportunity and commented that the text reflected what she remembered saying.

Focus Groups

Initially it had been planned that most of the data about the lead teachers would be collected by conducting a focus group. Focus groups are a form of group interview that relies on the exchange of ideas among the group who discuss the topic supplied by the researcher. The participants engage with one another, rather than the interviewer, and this allows the participants' views to emerge. One advantage is that the participants' views are allowed to emerge and not those of the interviewer (Cohen, Manion & Morrison, 2000). Another advantage is that the interview can produce a lot of data of a complex nature over a short period (Davidson & Tolich, 1999).

In addition to the interviews it had been planned to use focus groups to collect further data about the functions of the lead teachers. The advantage that a focus group offered would have been the interaction between the participants, rather than the interviewer, allowing the views of the participants to emerge (Cohen, Manion & Morrison, 2000). However during the data gathering it was noticed that the same discussions and exchanges of views were occurring during the lead teacher meetings. Since the research was carried out by a participant observer who was present at all lead teacher meetings the discussions observed during the lead teacher meetings were used instead of focus groups. Further support for this change was taken from Cohen, Manion and Morrison (2000) who indicate that focus groups are often contrived settings. In comparison the observed meetings were in a meaningful context making the originally proposed focus groups redundant.

Observations

Yin (2003) explains that case studies typically create the opportunity for direct observation which can create another source of evidence. Yin (2003) adds that the observations can be an invaluable aid for understanding the actual uses or potential problems in a case study. He makes a final comment that the reliability of the observations is enhanced by using a single observer. This research used a single observer who was a member of the lead teacher group, a participant observer.

By using a participant observer a number of unique opportunities were presented. As the observer was one of the lead teacher group he gained

access to events within the group and was able to "perceive reality from the viewpoint of someone inside the case study" (p. 94). Yin (2003) also notes that a participant observer may be able to manipulate minor events, in this case study and convene meetings and set the agenda of some meetings. While these manipulations are not as precise as scientific experiments they did produce a greater variety of opportunities to collect data. Cohen, Manion and Morrison (2000) add that the advantage of these manipulations is that they occur in the natural environment of the group.

Cohen, Manion and Morrison (2000) further argue that a participant observer as a long term member of the group being observed may reduce reactivity effects, "the effects of the researcher on the researched" (p. 311). Similarly because of the long term involvement of the participant observer with the lead teacher group the opportunity to watch events evolve over time is presented (Cohen, Manion & Morrison, 2000).

There are some problems with participant observers, both Cohen, Manion and Morrison (2000) and Yin (2003) warn that the observer may lose some objectivity in their observation and become a supporter of the group introducing biases. To help alleviate any bias the observations of meetings were compared to the formal minutes taken of the same meetings. Another problem that Yin (2003) describes is when the participants' role in the meeting take so much attention that there is not enough time to record observations, again reduced by using minutes after the event to help with any gaps.

The observations of the lead teachers were recorded as field notes in a separate part of the researcher's research journal. The notes took the form of detailed minutes of the oral part of the events observed.

There were a number of informal events where a lead teacher was approached by different staff for some quick fix ICT advice. While these events occurred mostly when the researcher was approached in his role of lead teacher they do provide a valuable source of additional evidence. For ethical reasons these observations take the form of reflections by the participant observer in the researcher's research journal.

There were a number of separate points where observations were made. The formal observations consisted of three meetings of the lead teachers, one professional development session for the lead teachers and three meetings between a lead teacher and a department planning ICT curriculum integration. Each of these events and the process of observation are described in the chronological order that they were performed in the following chapter, Findings.

Surveys (Questionnaires)

A questionnaire is a useful and widely used tool to extract survey information. Cohen, Manion and Morrison (2000) explain that the collected data can often be structured and or numerical data which is easy to analyse. They explain that the questionnaire is an appropriate tool to use with a larger sample to gather generalisations about the situation being researched. However, they

point out that a "questionnaire's general purposes must be clarified and then translated into a specific set of aims" (p.246). They suggest that a questionnaire must be clear in its purpose, ask appropriate questions and elicit data appropriate to the research being carried out. Furthermore the layout and appearance of a questionnaire is important, it must look attractive and interesting (Cohen, Manion & Morrison, 2000).

Cohen, Manion and Morrison (2000) describe three kinds of questionnaire, structured, semi structured and unstructured. They argue that structured questionnaires with closed questions are more appropriate for larger groups and are easier to analyse. This study used a structured questionnaire to look at the ICT skills of the school's staff, a larger group.

When looking at the ICT skills of the respondents in this study then a rating scale was needed, the advantage of a rating scale is to build in a degree of differentiation into a question. However the researcher is relying on the respondents to gauge their own skill accurately. To reduce the amount of choice a three point rating scale was used. (Dawes & Leask, 1999; Inglis, Ling & Joosten1999).

The Table 3.1 (p. 46) summarises each data collection point in the chronological order that the data were collected. This table briefly indicates the purpose of each data collection point

The next two sections, Background and Participants detail each of the key data gathering points and explain why each technique was used and the type of data collected. As this study is presented in a narrative style the data points are presented chronologically.

Background

Before this research could start with the collection of data about the nature of the lead teachers and their interactions with the wider staff of the school, it was necessary to explore how this group was established and had performed during the cluster. This information firstly was derived from two interviews, one with the Deputy Principal (DP) responsible for the lead teacher group and one with the facilitator from the cluster. The interview with the facilitator was a semi structured interview and was quite short seeking her views on how the lead teacher group had worked in the school during the cluster. The questions, contained in Appendix 2, used for this interview acted as general guide. The qualitative data this interview generated was used to establish how the cluster was viewed from the external facilitator's point of view and to summarise her perceptions of the previous performance of the lead teacher model of ICT professional development. The summary report to the Ministry of Education that would have provided this information more formally was not available at the time this study was written.

Secondly the school's teachers were surveyed for their computer skills. This would help establish a description of staff skill levels and help the lead teachers develop their professional development plan for the year.

From the above sources of data a description of the role and performance of the lead teachers during the cluster would be discovered and help to determine sustainability.

Deputy Principal

This interview was designed to be an in-depth analysis of both the performance of the lead teacher model during the cluster and how that model fitted with the broader culture of the school, from the Deputy Principal's perspective.

The interview continued and looks at the changes that had been made to the lead teacher model since the cluster had finished. The interview would seek the reasons for the changes made to the lead teacher model and the selection of the members of the lead teachers group in the current year. The significance of ICT professional development in the school would be established and how the lead teachers would be used to support this professional development would be explained. The goals and expectations of the lead teachers' group were shared and the Deputy Principal's role in achieving those goals.

Lastly the interview would look forward to the future and the longer term developments envisaged in the ICT area and how that could impact on the ICT professional development requirements of the school. All the data

collected in this interview was of a qualitative nature and reflected the Deputy Principal's interpretations of her role and that of the lead teacher's group.

The questions used as a guide for this interview are contained in Appendix 3.

Staff Survey

The first task that the lead teachers did at the beginning of the year of the study was design a teacher survey to establish the skills the staff had in using ICT and also to offer the staff a chance to request any particular professional development that they might require. Many writers (Dawes & Leask, 1999; Inglis, 1999; McKenzie, 1998) suggest that the important first step in planning any professional development programme is establishing the current ability and requirements of the staff. This researcher contributed to the survey design but because it was intended to be used by the lead teacher group to identify the needs of individual staff members, it could not ethically be used. However the collated results after the staff identification had been removed were used to give some general descriptions of the staff and what the staff collectively saw as their needs in ICT professional development. Therefore it is appropriate to discuss how this survey, found in Appendix 1, was designed and how the quantitative data that it would extract would be used.

The survey had two sections, the first part asked the staff to rank their skills at using computers in one of three levels. Both Inglis (1999) and Dawes and Leask (1999) suggest that a three level response reduces the amount of drift between individuals when using a larger number of choices so that a more

accurate picture of the staff skills emerges. The first section was divided into parts for each group of use with increasingly more complex tasks so that a picture of how expert the staff was in each area would be discovered.

The second part of the survey was more general, asking for any feedback about the computer skills. The last question, asking for any specific professional development requirements was designed to enable the lead teacher group to target any individuals with special requirements and to see if any specific area of professional development emerged. For ethical reasons this research only looked at these responses in a collective manner so that individuals were not identified.

During the three year period of the cluster there had been two surveys a year asking the teachers about their computer skills and uses. To allow comparisons and changes to be explored during the cluster the surveys took about twenty minutes to complete and each one asked similar questions. Because of these frequent surveys there had built up a resistance to surveys among the school staff, especially to longer questions requiring answers in words. This resentment was well known to the lead teachers so the survey was designed to be as far as possible a tick box affair and to take the minimum time possible.

The survey was administered at a staff meeting, deliberately saved till the last agenda item so that teachers could complete before leaving. The survey was handled this way to maximise the return rate and enabled the 56 staff who

were present to complete the survey this represented a 93% completion rate for the complete staff.

When the survey was administered a number of staff expressed their resentment towards another ICT survey but it was considered necessary as the exit data from the cluster did not include the new staff to the school. Because the study school is in a roll growth situation there were fourteen new teachers, which represented 23%, the teaching staff which invalidates the exit survey.

Survey of Computer Suite Use

The next step in the study was to look at how one of the school's computer suites was used. This data was originally planned to be collected by analysing the booking sheets, however informal observation discovered that the booking sheets and actual use often did not correspond. Sometimes classes booked into the suite never appeared and other classes often arrived at times when the booking sheets showed no entries. At other times teachers swapped bookings or came to other informal arrangements not recorded on the booking sheets. To overcome this problem this researcher, who had an office at the back of one suite, collected the data by direct observation of the classes using that computer suite. So that the original ethical considerations were met only the data that would have been recorded on the booking sheets was noted, the form level, subject and a general description of the task performed.

The use of the computer suites was recorded over 36 days in an eight week period when 99 periods were recorded. By collecting over such a long period it was anticipated that a general picture of the computer suite use would be observed. The researcher had previously noticed that sometimes one subject would almost completely dominate the suite bookings for a week as all classes performed a certain task, for instance in one of the observed weeks most of the school's Year 9 classes were observed doing a similar graphing task.

Therefore the accuracy of the survey was increased by direct observation and the longer term should have reduced random errors caused by clustering of events.

This section outlines the methods used to collect data from the lead teachers as they performed their functions during the research.

Lead Teachers

The main participants in this research were the school's lead teachers who would lead the professional development of the study school's staff. This section of the study describes how data was collected from the lead teachers about their work and how they viewed their work. The list of questions used for these interviews is found in Appendix 4

Four out of the five lead teachers agreed to be interviewed; the other lead teacher chose not to be interviewed for this research. However the four teachers provided a significant cross section from the group of lead teachers. It needs to be noted that lead teacher not interviewed consented to being part of the research but chose not to be interviewed.

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Summary of Data Collection

Table 3.1: Summary of the data collection used in this thesis

Who involved	Data collection method	Type of data	Number of events	Purpose of data collection
Staff	Survey form	quantitative	1	1. To generalise the staff ICT skills. 2. To identify any specific PD requirements
Cluster facilitator	Interview	qualitative	1	Background for formation of lead teachers and performance during the cluster.
DP responsible for PD	Interview	qualitative	1	1. Background of the cluster 2. Design and purpose of lead teacher group
Users of the Computer suite	Observation	quantitative	99	Description of the use of ICT in the school (data collected from 99 events over 8 weeks)
Lead teachers-meetings	Participant Observation	qualitative	3	Description of the lead teacher the planning and actions for PD
Lead teacher PD	Participant Observation	qualitative	1	Description of professional development undertaken by lead teachers
Lead teachers-interviews	Interview	qualitative	4	Discovery of the lead teacher's views on their role in delivery of PD
Observation of PD lead by LT	Participant Observation	qualitative	3	Description of how the LT deliver professional development

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Table 3.2: Triangulation of Data.

Research Question	Data Source	Meaning Taken From the Data
Roles and practices of LT before the cluster	Interviews with - facilitator - DP - LT Survey of staff ICT skills	Qualitative description of the actions of the LT during the cluster. Quantitative description of the skills of the existing schools staff, LT and how they contributed to the staff's current skill levels during the cluster.
Roles and practices of LT after the cluster	Interviews with - LT - DP Observations of the LT Survey of school's staff ICT skills	Qualitative description of the LT as they carried out their role as lead teachers and an insight into what the LT thought about their role as LT. Quantitative description of how the schools ICT resources were used which gave an indication of how the LT have influenced the school's staff.
Factors that helped or hindered the sustainability of the LT model of ICT PD	Interviews with - DP - LT Observation of LT carrying out PD	Qualitative description deduced from how the LT and DP viewed their roles in ICT PD. Qualitative description deduced from the actions of yjhr LT while leading PD.

Table 3.2 shows how the data gathered was triangulated to help ensure the collection of data using a variety of techniques and

sources for each of the research questions that guided this research.

Ethics

Cohen Manion and Morrison (2000) point out that social scientists have a responsibility to both their profession and their research subjects. They further add that "to take into account the effects of the research on the participants" (p. 56) and to maintain the dignity of the research subjects is regarded as ethical behaviour. In this research it was necessary to build on the trust between the researcher and the participants, in particular the lead teachers, to uncover the deeper truth of the case being studied. There was a potential ethical dilemma in that the researcher was at the same time a member of the lead teacher group. To strike a balance between the quest for knowledge and the participants' ethical rights the following processes were undertaken.

The research proceeded on the principle of informed consent. As Cohen and Manion and Morrison (2000) suggest, the permission of the school where the research took place was obtained before any research began.

All the participants had given an informed consent to the collection of data for this research. The lead teachers used in this research have read the transcripts of their interviews to check for validity and their names have been changed to protect their confidentiality. The lead teachers also have had access to the minutes and observations taken at the meetings that were observed for this research.

The complete staff were surveyed for their computer skills by the lead teachers and the results for this survey were collated to be used for this

research. Cohen, Manion and Morrison (2000) advise that the decision to complete such a survey is entirely the respondents'. Following their suggestion, to encourage the respondents to complete the survey, the respondents were guaranteed confidentiality and anonymity and non-traceability. The questionnaires from this survey were collated by the lead teachers and the collated results used by the researcher to help maintain this level of confidentiality.

There were no direct observations of students in this study.

Conclusion

This chapter has described and justified the methodology and methods used in this study, that being a case study of a narrative type using a participant observer (Cohen, Manion & Morrison, 2000; Yin, 2003). Secondly this chapter has described the methods of data collection and the nature of that data, qualitative and quantitative has been explained. Finally the processes used to interpret the data have been explained.

Chapter 4 – Findings

This chapter introduces the findings for the research in a chronological order as described in the methodology chapter. Each step of the evidence gathering is introduced and the findings presented with the key meaning of each individual piece introduced. A full explanation and homologation of the evidence is left till the discussion and conclusion chapter.

Background

There were four parts to the evidence gathering that were used to establish the context of this case study.

1. an interview with the facilitator,

2. a survey of the staff in the study school,

3. a survey of the study school's use of the computer suites,

4. an interview with the Deputy Principal responsible for professional development.

Each part is introduced in the following section that describes the background

Facilitator of the Cluster

The external facilitator from the cluster was interviewed to discover how and why the lead teacher model was introduced the study school during the cluster. The interview then sought the opinion of the facilitator about the success of the school and the cluster in general as a means of ICT professional development.

The facilitator worked from a local tertiary institute which provided a range of professional development services for schools, both primary and secondary. The four schools of the cluster were approached by the provider to form a cluster which was duly successful in a bid for Ministry funding. The facilitator was employed by the tertiary institution at this time, 2002, to deliver the ICT professional development of the contract. The model of lead teachers as described by Halliday (2001) at Papatoetoe College was introduced. The facilitator at this time also acquired two other secondary schools from another cluster which were not using the lead teachers model of ICT professional development. She says "they were doing very ICT oriented work, like how to use Inspiration". This comparison helped her form the opinion that the lead teacher model was an effective model to use in the secondary school environment, as the facilitator explains.

> That the lead teacher model could be one way of doing work in a concentrated way with a core group of teachers and get them to make the change and they model it or work with teachers in their area.

The facilitator described how pedagogical change is an important part of the ICT professional development process and adds that the lead teacher model provides opportunity for pedagogical change because the model is in touch with the teacher's classroom needs.

In talking about the successes of the schools in the cluster the facilitator suggested that the results were varied between the schools. She indicated that the study school was particularly successful because of the way the principal's understanding and awareness of the role of ICT in teaching and learning, pedagogy, had changed. She added some schools changed in areas

where there was an exceptional lead teachers but did not make the shift to pedagogy.

Survey of Teachers

The survey found in Appendix 1 was administered to the staff at a staff meeting to increase the completion rate. Fifty six staff which represents 93 percent of the teaching staff completed the survey. Cohen, Manion and Morrison (2000) suggest that a random sample of 52 from the population of 60 teachers would give a 95 percent confidence interval. Thus the high completion rate suggests that the results of this survey can be viewed with high level of confidence.

The survey was divided into parts. Each part represented a different application of ICT, and then each part was sub-divided into tasks that allowed the respondents to rank their ability at that application of ICT. This division of the task was intended to allow the researcher to total the rank that the respondent had selected for each task. The total was coded by the researcher to rank the respondents' abilities into four categories for each different use of ICT. The categories were given descriptors, Expert, Able, Satisfactory and Limited to describe the respondent's ability at that particular application of ICT. By the researcher establishing this structure a detail of what the respondents could do in each part was established as well as an overall ranking of their ability for that particular application of ICT. The number of respondents in each user category was counted and recorded as a

percentage of the total number of users to create the summary table 4.1 below.

Table 4.1 Staff Skills using ICT

Use (n=56)	Expert Users	Able Users	Satisfactory Users	Limited Users
Environment	31%	19%	38%	13%
E-mail	40%	17%	31%	13%
School Intranet	15%	4%	23%	58%
Classroom Manager	44%	17%	29%	10%
Word Processing	60%	13%	21%	6%
Spread Sheets	21%	13%	42%	25%
Presentation Software	27%	2%	35%	35%
Web Authoring	6%	17%	4%	73%

The most striking thing about this table is the high percentage of teachers who were classed themselves as expert users of word processing, 60% of the sample. Equally surprising only 6% of the teachers in the survey were considered as limited users of word processing, as this only represents 3 teachers it is an unexpectedly small number. Table 4.1 also shows that teachers are confident users of email. These two results seem to fly in the face of conventional wisdom about teacher ICT skills (Dawes & Leask, 1999; Inglis et al, 1999). It would appear that teachers are better users of ICT than they are popularly given credit for, and this makes sense when it is considered that both word processing and email familiarity are modern necessity of a teachers work.

Classroom Manager (CM) is a piece of software that the school uses for student administration. Again staff are able users of this software, again a requirement of the job and have had specific training in the use of this software. Classroom Manager is used to record marks, write reports and record all the pastoral events and administer the student details. It needs to be noted that this software has no use in the classroom and is used only for the school's administration purposes.

In Table 4.1 the lower percentage of expert users for spreadsheets and web authoring tools seems to indicate that the staff are less expert at the use of these types of software. This could be explained because most teachers would seem to have little use for these tools. However in both cases there are a number of expert users.

The survey of the staff to acertain their ICT skills highlighted a number of important points about the staff skill in ICT usage. The school's staff have a number of very skilled users of ICT, as illustrated by every category of software use having at least some expert users.

Table 4.1 seems to indicate, from the high percentage scores that there is a larger number of expert users among the staff especially in the areas of ICT that staff are expected to be using on a regular basis in their ordinary work as teachers such as word processing, email and Classroom Manager. Equally while there are some expert users, they are a small number in applications

that have less relevance to the regular work that a teacher would be expected to be doing, such as web authoring and intranet appications.

It is important to note that the survey has indicated that there are some expert users in every category, this creates the opprtunity to develop a group of lead teachers to lead the professional development of the schools staff in ICT.

Looking at Table 4.1 it is apparent that every use of ICT has a number of expert users, and it is this that suggests that the use of lead teachers is an appropriate model for ICT staff development. There exist in the school a core group of staff with excellent ICT skills which can be used to "trickle down" (Ham et al 2002, p. 12) the professional development to the rest of the staff.

What this could mean and the other parts of the data in table 4.1 is broken out and summarised for meaning in the following chapter, discussion.

As well the survey asked for some opinions of respondents and for any special requests for professional development, these sections of the survey were only completed by 8 (14%) of the respondents, a reflection of the survey fatigue that the cluster had imposed on the school. The responses were all requests for specific professional development; with some respondents making multiple requests. The largest was 7 for intranet, 5 requests for spreadsheet professional development and 3 requests for help with using the

data projector. The use of the intranet was to become the focus for the lead teacher led professional development during this year.

Interview with Deputy Principal

The DP was interviewed on two different occasions, this happened because of time constraints. While the two interviews can be considered as a continuum the findings from her interview is discussed in two parts. Firstly the following is the part of the interview that relates to her description to the background for the research. The second part of the discussion of her interview explores what happened during the time of this research and is discussed along with the findings from the lead teacher interviews.

In response to the first question asking about how the cluster had started in the school and how the lead teacher model had begun the DP noted that the school had a tradition of committees and staff representation. This meant that the wider staff were offered the opportunity of joining the lead teacher group.

> "Initially we asked for staff who were interested and had some strength in ICT. These people were not supposed to represent their area but act a critical voice. So what happened was we had a flow on from the IT committee so in fact it ended up with three people from one department. So, I think, we shoulder tapped looking for a broader representation".

Thus the lead teacher group was formed, made up of staff who the DP considered had some "dynamic enthusiasm" and "interest and expertise". The lead teacher group now consisted of teachers from the full range of curriculum areas who the DP felt had the confidence of the wider staff.

At first there was reluctance for some of the lead teachers to engage with the lead teacher role because the lead teacher role was still not clearly defined.

The DP observed, "there was a lack of clarity for the lead teachers." The DP continued and suggested that this reluctance, from the lead teachers, was overcome at the second lead teacher professional development session when the facilitator led them in some problem solving exercises to define their role. The DP comments "they came out humming and were really fired up". The DP now believed that the lead teachers were now ready to roll out the professional development for the staff.

The lead teachers now had a clear idea of their function and led an all staff professional development session, as they would over the time of the cluster. These professional development sessions were well received as they focused on student uses of the ICT being "showcased". This helped create a willingness to be involved in the coming professional development.

Initially the traditional departments received their training which was task based. The training had a specific link to a curriculum area "so it was meaningful". The project gathered a momentum of its own as different departments were trained by the cluster facilitator in using ICT in their curriculum area. At this stage the facilitator led the professional development with the intention that the lead teacher in that departmental area would extend the professional development. Each department then worked within a specific time scale and the facilitator visited again to take a second session for the department to report progress and receive extra professional development. The DP stated that this created a "sort of due date" which helped apply a "gentle discreet incentive" for the teachers involved to complete the tasks that

they had been assigned to do in the initial training. The significance of this "due date" or "deadline phenomena" is further expanded on in the discussion chapter.

In completing a description of the background to the lead teachers' programme of ICT professional development the DP commented on how the lead teacher model fits into the school's collaborative management style and "egalitarian way of operating". She noted that this manner of operation did create some tension because ICT is not curriculum area and it intersects with some of the roles of the professional development committee.

As the final stage of the background description it is necessary to present the findings from the survey of the use of one of the computer suites.

Computer Suite Survey

The study school has no computers in classrooms so it is safe to assume that the only use that students have of ICT is in the school's computer suites apart from occasional use of teacher laptops for the use with datashows.

The school has three computer suites. There is one specialist suite in the design area which is used almost exclusively by senior students in the Technology and Art Departments. The use of this suite was not surveyed. The suite surveyed has the newest computers so is the suite of first choice for general school use. Lastly the third suite has older less reliable computers and is used as an overflow suite when the surveyed suite is full mainly for research or word processing tasks. Thus the survey represents the typical use

of the computers for the school apart from the senior students in Art or Technology, a specialist use.

The use of the computer suite was coded to show the main software use and the general type of activity carried out. The raw data was then converted using pivot table to show how the use varied with subject and year level.

Firstly the pivot table for general activity by subject area is shown as table 4.2 below.

Table 4.2 Subject Use of ICT

Activity (n=99)	Accounting	Art History	Biology	Business Studies	Economics	Classics	English	ESOL	Geography	History	Media	Mathematics	Science	Social Stud	Technology	Tourism	Work Experience	Total
excel formula												3						3
excel graphing												6						6
excel survey														1				1
inspiration/pp/poster													2					2
MYOB	1																	1
power point													2	7	1			10
Publisher			2			2	5											9
research directed		1				2			1				6	4	5	2		21
research undirected					1	1				3	1		6	4	2			18
web questions							1						2	4				7
web quiz									1					5				6
word processing				1			1	4	1						5		3	15
Total	1	1	2	1	1	5	7	4	2	4	1	9	18	25	13	2	3	99

Table 4.2 clearly shows that Social Studies and Science are the two biggest users of the computer suite and that these two subjects are significantly bigger users of ICT than any other curriculum area. Collectively Science and Social Studies account for 39% of the total use of the computers suite observed.

The second discovery that can be made from table 4.2 is that the most common type of use of the computer suite appears to be research, 39% of the recorded uses are research, either directed or undirected. Research also spans the greatest number of curriculum areas, occurring in 10 or 56% of the surveyed curriculum areas.

Table 4.3 is a pivot table from the observations of the computer suite and shows the type of ICT use compared to year level.

Table 4.3: ICT Use by Year Level

Count of no events	Year					Grand
Activity (n=99)	9	10	11	12	13	Total
excel formula		3				3
excel graphing	6					6
excel survey		1				1
inspiration/power-point/poster		2				2
MYOB (accounting software)				1		1
power point	5	5				10
publisher	3	2		4		9
research directed	5	3	8	2		18
research undirected	1	10	4	5	1	21
web questions	3	3	1			7
web quiz	1	4	1			6
word processing		5	3	7		15
Grand Total	24	38	17	19	1	99

From the extended survey of the computer suites two very distinct trends emerge, firstly the tendency for the amount of computer use to reduce in the senior school.

Table 4.3 also indicates that the largest use of the computers is research and shows that research is reasonably evenly spread across all the year levels. Table 4.3 also indicates that the main use of the computer suites are by Year 9 and 10 students, they account for 62% of the observed uses but only comprise 54% of the school roll. There is tail off of computer use as students become more senior, only one year 13 class was observed in the eight weeks observed. This tail off is more dramatic once it is realised that ESOL and

employment skills classes do not do formal qualifications, NCEA at year 12. Removing ESOL and Employment Skills classes from the data, so that that the year 12 numbers reflect classes working at a year 12 level of qualification reduces the number of observed Year 12 classes to 12.
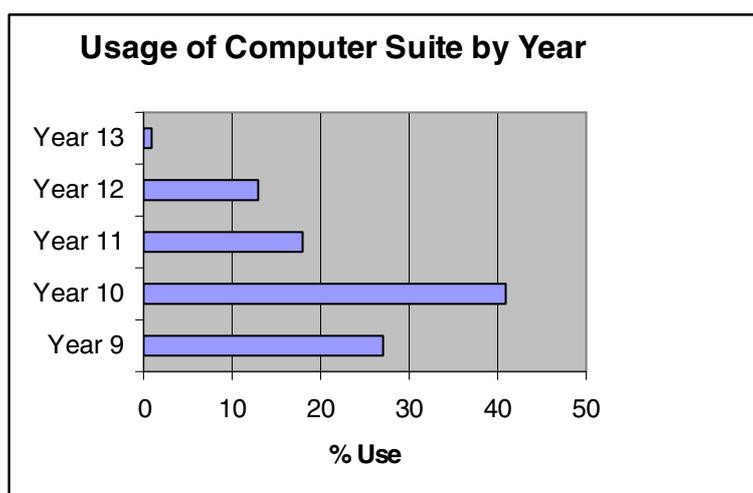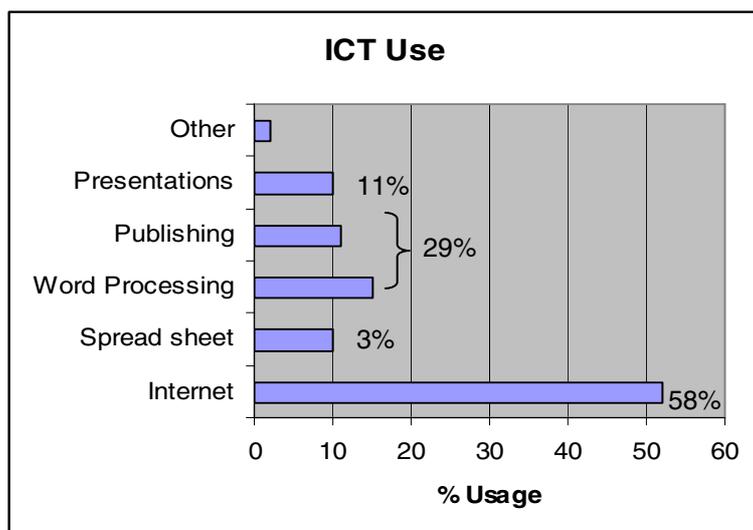
Usage of Computer Suite by Year

Figure 4.2: Usage of computer suite by year group

This trend is identified clearly in figure 4.2 where the use of computers in Year 13 has almost disappeared from the graph. Coogan (2005) identified this trend among New Zealand English teachers and explains that as the pressure of high stakes external assesment (NCEA) increase in the senior school the use of ICT for teaching and learning reduces. Conversly Figure 4.2 shows that in the junior school, Years 9 and 10, there is a much greater use of ICTs for general classroom use.

Secondly table 4.2 indicates that the main usage of computers in school is the Internet. The data in table 4.2 was then grouped into generaic uses across all year groups and presented in a graphical form in figure 4.3.

ICT Use

Other
Presentations — 11%
Publishing
Word Processing — } 29%
Spread sheet — 3%
Internet — 58%

% Usage

Note
The numbers shown on the graph are taken from the cluster exit survey in 2004 for comparison.

Figure 4.3: Description of general ICT usage

Figure 4.3 indicates that more than 50% of the usage of the computer suites was using the internet for research, more than twice the usage of the school's computers for any other application, even when publishing and word processing are added together (29%). When the usage observed is compared to the usage described from the 2004 cluster exit survey the same pattern of usage emerges. This supports the argument that the usage is similar, and so the professional development that supported this usage has been sustained.

 Equally interesting is the the observation from Table 4.3 that about half of the internet usage was for research undirected by the teacher, sometimes with only loose connections to the subject curriculum. The type of reseach was not a focus of this research and is an area that could be subject to further study, and coincidentally the school has set the use and process of research as its focus in 2006 for professional development.

Having discussed how the lead teacher model became established to deliver the professional development during the cluster and how the study school now uses its ICT resources, the rest of this chapter looks at how the lead teacher model progressed during the year after the cluster ended.

Lead Teachers

Initially this section of the thesis looks at the process the lead teachers used to establish what and how they would develop the professional development for the current year. Below is a chronological review of the process that the lead teachers went through.

Professional Development

The teachers who had volunteered and been selected for the lead teacher role during the current year had an initial day of professional development. This development consisted of two hours training with an outside provider in the use of the school's recently purchased intranet. This was well received and helped raise the enthusiasm of the lead teachers as they learnt how to use the intranet and of the possibilities it offered in their curriculum area. This was followed with a discussion on how to use the intranet in the school and to formulate the standards that would be used with the intranet. Finally the last two hours of time was used individually for the lead teachers to develop some resources for their subject area on the new intranet.

This day proved a valuable time as it stimulated the enthusiasm of the group, a similar response from the previous year's group where the Deputy Principal noted that it was the opportunity for some fulfilling professional development that engendered a renewal of enthusiasm in the lead teachers. As well this professional development also gave the lead teachers the opportunity to set a task based focus for the year; the introduction of the intranet to the school.

In both the interviews with the lead teachers and the following meetings lead teachers commented on how valuable this professional development had been. The value came from setting the context for the lead teachers to work within, in this case, the intranet.

Thus the enthusiasm of the lead teachers had been channelled into the task that the group was about to lead in the professional development of other teachers at the school. As well, the professional development of a smaller group of lead teachers was possible within the existing resources of the school (Hargreaves & Fink 2003). These two factors, enthusiasm of the group and using existing resources, contributed towards the lead teacher model of ICT professional development being sustainable within the study school.

Meetings

Immediately following the professional development two meetings of the lead teachers were scheduled for the following term. However, this meeting was arranged by mutual agreement of appropriate dates in the following few

weeks and was not posted on the official list of term dates published by the Deputy Principal. This single fact was to have a huge impact on the following meetings. In the days before the meetings an agenda was placed in pigeon hole of each of the respective lead teachers. By the time the day of the meeting arrived a number of the lead teachers had offered apologies for they had forgotten about the meetings and arranged other things. Because of the number of the lead teachers who were unable to attend the lead teacher meetings were postponed. There were no lead teacher meetings in that term

The following term the lead teachers meetings were published in the school's meeting schedule. The meetings then occurred. Thus a single important discovery was made, meetings need to be scheduled in the school's overall planning and published as any other event.

When the meetings were included the central planning process two significant changes occurred. Firstly, the participants could quickly access the times of the meetings from the central planning records and make arrangements accordingly. Secondly, the meetings were given a greater degree of importance. By being on the official list of meetings the participants realised that the meetings had the weight of management support.

Initial Meeting

The initial meeting started with this researcher explaining his intended work during the year, part of the informed consent process (Cohen, Manion and Morrison, 2000). The background to the research that would be occurring

during the year was explained. The continuation of the professional development programme that existed during the cluster was presented as a focus, along with the hope that the lead teachers would become an established part of the school's ICT professional development programme. Finally, the focus of the professional development would be integration of ICT into the existing curriculum, and less on the individual ICT skills of the teachers.

The Deputy Principal picked up the discussion and explained how the lead teachers had been selected and what it was intended that they should do. The meeting minutes recorded and summarised her statement:

> All members of this group are experienced and respected (by the staff) teachers that represent a significant curriculum area in the school. The school has and will be investing professional development in this group with the idea that the knowledge gained trickles back into the wider staff of the school.

The following discussion arrived at a description of the lead teachers that the minutes listed as:

- The lead teachers act as an access point for staff queries, just in time professional development;
- That at times the lead teachers can help departments organise their ICT programmes; and
- That lead teachers should be acting in an initiator role with the new technologies, for example intranet, applications of software, use of projectors, interactive whiteboards etc:

Thus the role of the lead teachers had been defined by the DP and discussed by the lead teachers. This was a defining moment in the development of the lead teachers as a group and clarified to them their role.

Then the meeting proceeded to a discussion about what the group would focus on for the year. The professional development of the school staff was to focus on the use of the intranet.

The meeting had helped to refocus the lead teachers after a long break since the initial professional development meeting. Significantly at this meeting the Deputy Principal had clarified the role of the lead teacher group. This clarification had demonstrated to the lead teachers that they had an important role and that the school management supported the role of the lead teachers.

The next meeting occurred four weeks later, as part of the usual meeting cycle. This had not happened during the previous term and was an effect of the meetings being included on the published meeting schedule. This meeting was very focused on the tasks that the lead teachers had embarked on.

The meeting opened with a report back about the intranet professional development that the lead teachers had started with their departments after the last meeting.

By having previously set a specific task, intranet development, the meeting proceeded smoothly and produced a range of outcomes for the lead teachers to implement. At the end of the meeting there was some time for general business and this opened up some problems with the school's computer systems. This was not part of the business of the lead teachers group but this meeting allowed some of the members to vent a frustration that they and

some of their fellow teachers had. The outcome was clarification of the problem and an agreement to take the issue to the appropriate part of the school management. The teacher who had raised the issue had felt supported by the group and there was an outcome that would see the issue addressed. The lead teacher group had acted to support one of their group and addressed a problem with the school's computer system.

The process of the lead teachers' planning and their meetings has been described and explained. The next section of this thesis describes how the lead teachers carried out their professional development of a selected department.

Delivering ICT Professional Development

The researcher then followed the professional development of one department in the process of planning the ICT component of their curriculum for the following year. This process at times involved the researcher as an observer and at other times as a trainer who delivered some of the professional development. The researcher was involved in four separate meetings with the department which took about six hours of contact time with the department. Because one of the aims of this thesis is to describe the role of lead teachers in delivering ICT professional development, the observations are limited to the actions of the lead teachers and the researcher.

The researcher led the initial meeting which had two purposes, firstly to show the department how the intranet worked and the possible uses of the intranet.

The second part of the meeting was to plan how the department would use the intranet.

Initially the researcher delivered the professional development by demonstrating the school's intranet, showcasing some of the school's other departments that had started to develop the intranet. Next the researcher led the department through some examples from other schools of the same subjects use of intranets or internets. Thus this was largely a presentation that showcased what was possible for the department and succeeded in raising the enthusiasm of the department staff, as evidenced by an increased engagement and regular questioning of the presenter (researcher in this case).

The second part of the meeting was the planning for implementation and was run by the head of department and the researcher in his role as a lead teacher acted as a source of advice. This part of the meeting was very productive with the meeting finishing with most members given a range of small tasks to complete to enable the department to start the construction of their part of the intranet. The role of the lead teacher was passive but provided the department for a catalyst for their ideas.

The next two meetings were to investigate the how the department would increase its minimal integration of ICT into the curriculum and use this to identify the professional development that the department needed. The researcher, in his role as a lead teacher chaired the meetings with the intent

of the department's teachers exploring the possible ways that ICT could be integrated into the curriculum. It should be noted that the head of department was not present at either meeting, she had done this to encourage free discussion by the two groups.

Each meeting started with an explanation of the purpose of the meeting, to explore possible topics within the department's schemes that could be enhanced by integrating ICT into the scheme. The department already had one topic that met the school's curriculum ICT goals but they accepted that this unit was dated and used a "demonstrate and copy as I do" kind of pedagogy. The aim was to develop a more student centred unit of work.

The teachers explored what they had seen done or ideas that they had about how ICT could be used to enhance the delivery or student's learning. This discussion varied between the two groups, the first group focused on subject specific software. The absence of the head of department had meant that the first group had engaged in a free and open discussion and it had been important that this group was independently chaired to help it maintain some degree of focus. The second group needed a little prompting but when they got started talked more about how the ICTs could be used to develop student centred tasks from the work that they already did. With the second group the lead teacher had a minimal role, just occasionally asked for a little guidance.

From these two meetings the lead teacher, the researcher, reported back to the head of department with the minutes from each meeting. The head of

department then looked at the recommendations from each group. She decided to investigate the software identified by the first group and that the recommendations of the second group would be followed up in the next professional development meeting, to plan for implementation into the scheme for the following year. This led to the last stage of this cycle of professional development, which was the planning of the unit to be used in the following year.

The final meeting in the series was to discuss what changes the department would make to its schemes to integrate ICT into its curriculum. Before this meeting occurred the lead teacher and the head of department met to discuss what topics would be used in the schemes being discussed. This allowed the lead teacher the opportunity to prepare some ideas for possible ICT tasks. The topics chosen had a number of exemplar units available from the Ministry of Education web site, http://tki.org.nz/e. These were printed and given to the department staff to act a starting point for the discussion. This time the meeting was chaired by the head of department and the role of the lead teacher was advisory.

The meeting started well. The previous meetings had laid the ground work so that the department members knew the purpose of the meeting. The meeting proceeded in a business like manner with the department members focused on producing a unit that they would be able to use in the next year. Those present bounced ideas around as the details of the unit took form. The presence of the lead teacher was vital in this process guiding and affirming

the department members helping their ideas to take a shape that was practical with the school's ICT resources. By the end of the meeting the planned unit had a form. The head of department assigned various department members the assorted tasks of writing the elements of the unit up ready to be implemented in the following year.

After this process had finished the head of department expressed pleasure in the progress the department had made in planning for ICT integration. When asked for feed back she said,

> I am pleased that the teachers have taken ownership for the development of ICTs in teaching and expect to implement a unit next year. As well we have identified about five other units that can be developed in the future, this will allow us to continue to develop our units. The process was well worth the effort.

The process of professional development used with one department has been described. How the lead teacher guided them through a professional development process that allowed the department's teachers to develop a positive attitude towards ICTs in their subject and take ownership of their units of work. Importantly the integrated ICT used the school's available resources (Fullan & Hargreaves 2002) making the eventual implementation far easier.

Lead Teacher Interviews

Finally the lead teachers were interviewed to explore how they had found their involvement in the professional development process and their opinions on the lead teacher model for delivery of ICT professional development. The interviews were all conducted by the researcher with four lead teachers, all of whom had been lead teachers during the cluster. Although they were not asked to draw comparisons some comparisons were made by individuals. The interviews have been homologated by theme so that the responses from all the interviews are mixed through the following section of this thesis. Where elements of the interview with the deputy principal, responsible for the lead teachers, help with the themes the lead teacher interviews touched on, her comments have been added.

Personal Involvement

Only one of those interviewed, Mark, remembered how he had originally been asked to become a lead teacher. He described how he had been a member of the ICT committee and from that committee role he been given the responsibility to help foster the lead teacher group when it had originally formed. Rod was a late comer to the group but along with Judy described how their use of ICT with students and an interest in ICT lead to them being involved with the lead teacher group. Jo didn't remember how she had become involved but stated "I thought it would be good professional development for me". Even though the lead teachers didn't seem to be aware of it they had all been selected by the deputy principal (Keri) as "experienced teachers who covered a range of curriculum areas the staff respected".

All four interviewees went on to explain that that they were interested in ICT and the opportunity that the lead teacher group offered for further personal development in the ICT area. Jo and Rod both commented that the professional development offered to the lead teachers was more fulfilling because it was offered at a relevant level for the lead teachers.

However Mark pointed out that being a lead teacher "relied heavily on input from teachers already overloaded". Keri added that because they were all experienced teachers several of the lead teachers had other responsibilities which could lead to undue pressure on those lead teachers.

Role of Lead Teachers

All of the interview subjects commented that they had enjoyed the role of lead teacher and had found it rewarding. All had enjoyed the extra professional development opportunities that the lead teachers had experienced. Both Mark and Jo added that they had enjoyed the opportunity that the cluster had created for attending conferences, as Mark commented, "Rotorua trip was real good, real cool" and Jo added:

> I found the TUANZ conference really useful and really interesting. Finding out what was happening out there and it really helped me find software I was going to use in my classroom. Just good to see what other schools are up to and getting ideas.

Unfortunately the year that followed the cluster had not been able to offer the same opportunity to attend conferences, but they seemed important to the lead teachers, helping to strengthen their role and could be considered an element of professional development.

From the interviews all of the lead teachers showed an understanding of the lead teacher role. Rod's comment is typical and shows an understanding that the lead teachers had:

It's a cascade model, where you spend a lot of time investing in one person who can pass that on to other people who they come into contact with.

This understanding of the lead teacher role seems important to the successful implementation of the lead teacher model of ICT professional development.

Mark and Jo pointed out that while the lead teacher role in providing professional development was fulfilling it however often extended to other times. They both indicated that because they taught in the same site as the teachers who they had trained they were far more assessable than an external trainer. Mark commented, "I am often approached for a little ICT advice in the staff room" and Jo added "teachers sometime stop me around the school to ask for some quick fix to an ICT issue". Thus two of the lead teachers recognised that there had become a just-in-time component of their role as lead teachers.

Lead Teacher Perspectives on Students use of ICT

From the interviews it was clear that the lead teachers had a clear understanding of how they saw students should be using ICTs. Mark saw his role as leading students to an understanding that "ICT is a tool, not a neat little toy". Rod indicated that the ICTs had an important role to play in modelling, allowing students to change one factor and see how that could affect the final

result. Judy continued on the same theme explaining the advantages of brain storming using Inspiration. Jo, who uses media editing software in her subject, extended these ideas to using specialist software:

> They (students) know better and they catch onto it quicker and so I show them the basics on how to use the software and then they play.
> I give them time to play.
> And then they are the ones that find stuff, they show me, and over the years I have gotten better at it – and I'm not scared of them knowing more than me. I check them out and say help me.

Judy was less positive about specialist software describing using some high order applications such as computer aided design (CAD) could help students in technology but "the time investment necessary to teach the kids how to use it to get them to the point of competency" meant that it was difficult to implement all aspects that were available and cover the curriculum.

The lead teachers showed a unity of purpose, looking to use ICT with students in a hands off manner allowing the students to explore the software. Thus the subject material being used became the focus, not the ICT being used, as Mark said, "a tool" for learning.

The researcher noticed that the lead teachers where often self effacing about how well they had worked as lead teachers. Jo commented, "I have shown some people the basics" and later added, "I don't feel like a lead teacher", underrating her performance as a lead teacher. These were typical comments from the lead teacher group and undersold their impact. They took the same approach with the teachers as they did with the students. The lead teachers

got along side the teachers showing them "the basics", helping when teachers were stuck and encouraging the teachers' progress.

Summary of Lead Teachers Interviews

The lead teachers had a good understanding of their role and were supportive of the lead teacher model, what Keri called "clarity of purpose". The make up of the lead teachers was important, as Keri indicated "that the balance between expertise and ability to work along side fellow staff". The key themes that emerged from the interviews of the facilitator, deputy principal and the lead teachers are summarised in table 4.4.

Table 4.4: Summary of Interviews by Theme

Theme	Facilitator	Deputy Principal	Lead Teachers
PD of LTs	Significant motivation tool for lead teachers.	- Important to build the skill base of the lead teacher. - Helps provide motivation for the lead teachers.	- All expressed the importance of PD - All commented that PD helped to build their skills and confidence. - 3 added helped to improve their motivation.
Role of LT	Important to disseminate the PD through the school.	- Model consistent with collaborative nature of school. - Emphasized the choice of the LT was very important.	- All understood their role in ICT PD in the school. - All found the role rewarding. - 2 expressed concern about increased workload. - All commented on informal interactions with other staff for just-in-time PD.
Student use of ICT	Saw this a s the main purpose of developing staff ICT skills.	Saw student use in teaching and learning as the key reason for ICT PD.	- All recognised it was important that students learnt to use ICT as tool. - 3 saw ICT as a tool for improved student learning. - 2 didn't see personal ICT skills as a barrier to student use of ICT.
Personal use of ICT			All were enthusiastic users of ICT with their students though their personal skills varied.

The lead teachers had enjoyed the extra opportunity for personal ICT professional development. They saw the main advantage of the lead teacher model as delivering targeted ICT professional development to teachers as they needed it rather than in the more general whole school delivery mode. While the lead teachers did not comment on the pedagogical aspect of their delivery of the ICT professional development it

was apparent from how they saw students learning with ICT that they had a unified approach of treating ICT as a tool to enhance learning in their particular curriculum area.

Chapter 5 - Discussion and Conclusion

Introduction

The intent of this chapter is to firstly describe how ICT professional development was delivered before the Ministry funded cluster finished. Next the effectiveness of the role and practices of the lead teachers in delivering ICT professional development after the cluster ended are discussed. Finally the chapter develops the theme of sustainability and draws some conclusions on the sustainability of the lead teacher model of professional development in the study school.

Description of the cluster model used for ICT professional development.

Firstly it is necessary to briefly describe the system of ICT professional development that existed during the cluster. While the lead teachers existed during the cluster there was an external facilitator who provided most of the professional development. The facilitator worked directly with each department in the school to develop a professional development programme that was tailored to each department's requirements. The professional development was a mix of how to use the ICT as well as how to use the ICT for teaching and learning of the students, pedagogy. The facilitator indicated that it was this joint focus on ICT training and pedagogy that was the particular strength of this model of professional development, as described by Halliday (2001).

The lead teachers acted to supplement the professional development that the facilitator provided, because they were on site. Teachers were able to approach the lead teachers for support - just in time support. These lead teachers by both attending extra professional development and a variety of conferences were used both to model the use of ICT with students and to be exemplars for the rest of the staff in the use of ICT. Again the focus was on improving both the ICT skills of the lead teachers and their understanding of the use of ICT for student teaching and learning. The facilitator commented that this model had proved very successful in the study school during the cluster when real progress in the use of ICT had been made.

The structure of the lead teacher model used by the school for ICT professional development during the cluster is outlined below in Figure 5.1.

Model of Communication During the Funded Cluster
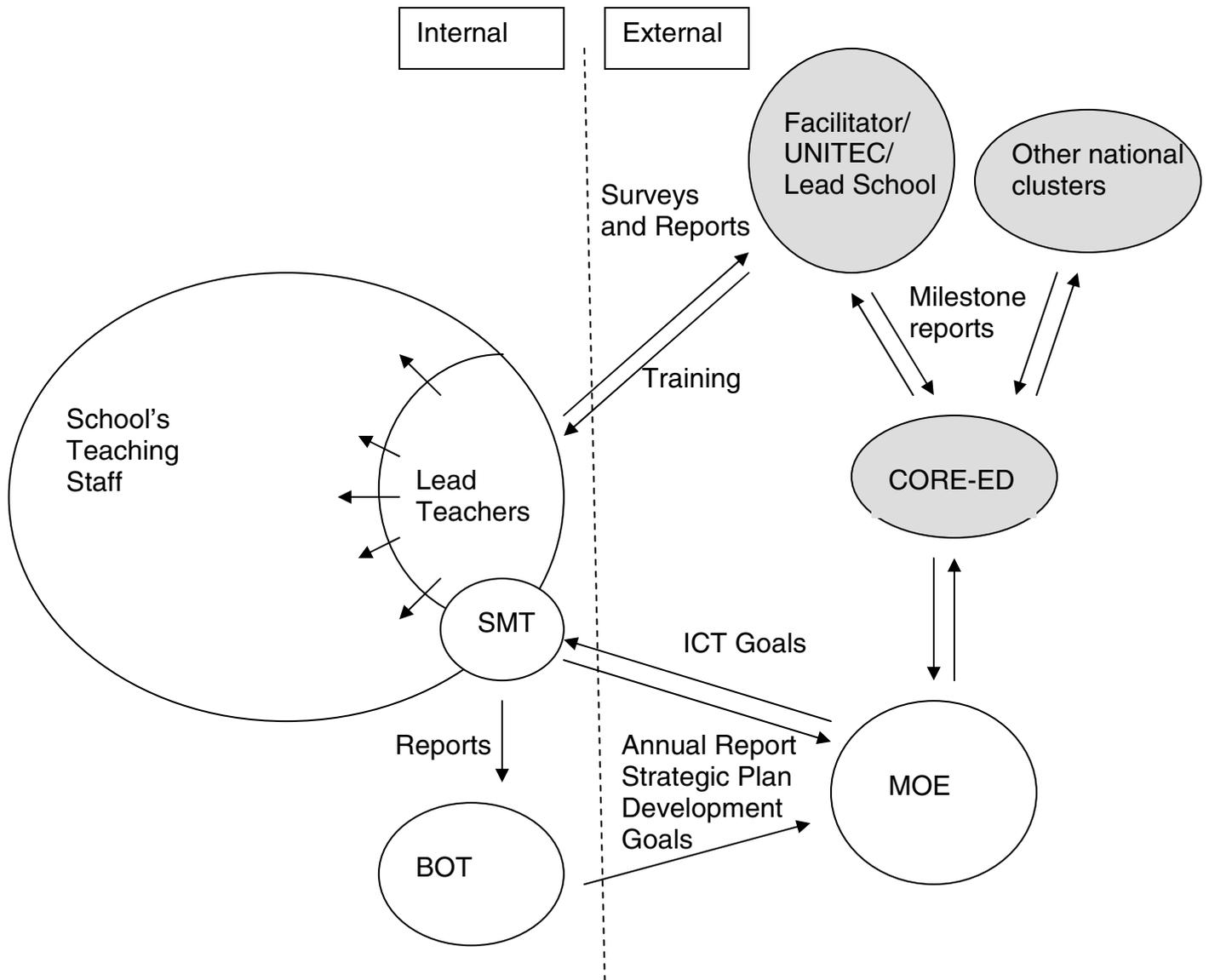
Figure 5.1: Communication during the Cluster Funded Model ICT Professional

Development

When the cluster finished the support of the facilitator, CORE-ED (organisation contracted to the Ministry of Education to administer the clusters nationally) and the links to other clusters disappeared along with the funding for those links. The whole top right of figure 5.1 was removed.

The lead teachers continued to work under the leadership of the deputy principal responsible for the school's professional development programme. However the ordinary running of the group was left to the teacher who acted as a chair for the group.

Description of the ICT professional development model used after the cluster.

Model of the communication after the cluster.

Figure 5.2 shows the major change, that the external support of the cluster has been removed. The lead teachers continued to work under the leadership of the deputy principal responsible for the school's professional development programme. However the ordinary running of the group was left to the teacher who acted as a chair for the group.
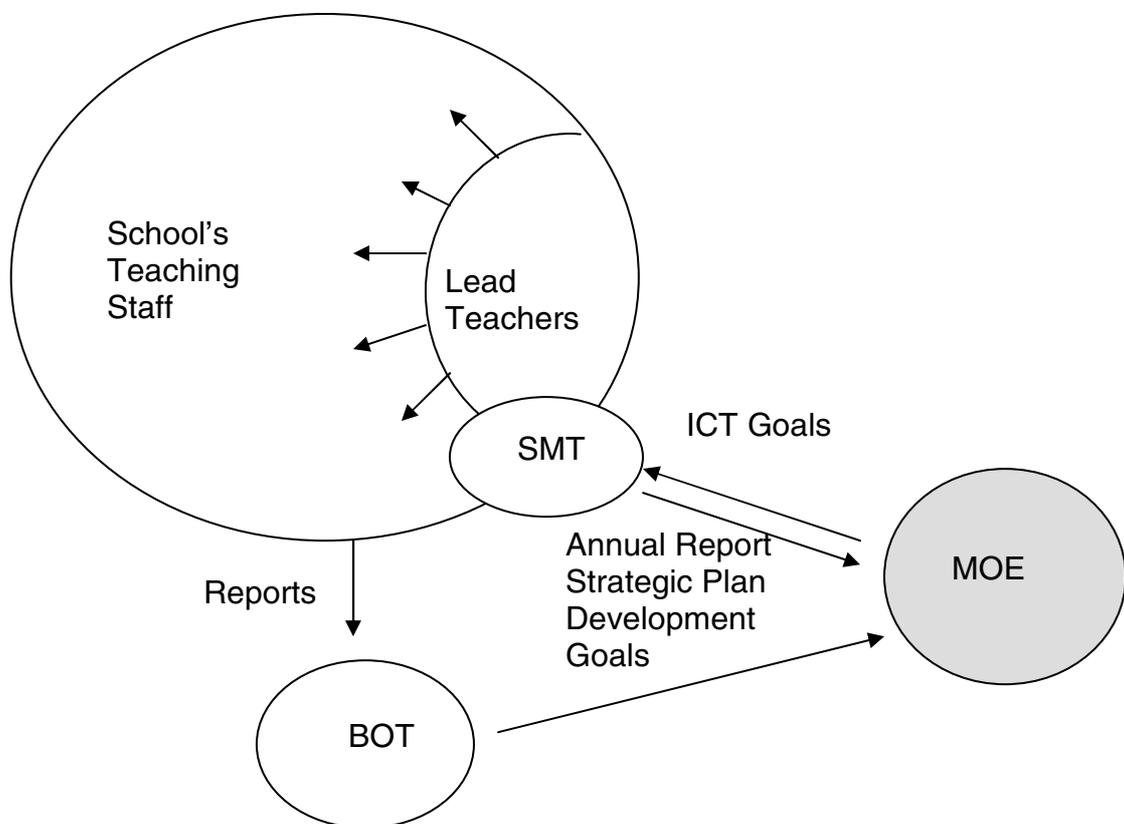
Figure 5.2: The Communication after the Cluster Funding Ends

The next section of this study looks at the lead teachers and describes their roles and practices as lead teachers and discusses the factors that affected the group of lead teachers.

Lead Teachers

The choice of the members of the lead teachers group is critical to the success of the group (Bush & Middlewood, 2005). During interviews both the facilitator of the cluster and the deputy principal emphasised that the correct people must be picked for lead teachers. The lead teachers needed to be experienced teachers who had good skills with ICT. However more importantly the lead teachers needed to be respected by other teachers if they were to have any impact with the staff that they were going to be working with, or if staff were going to seek them out for just in time advice.

The group of lead teachers in this study were all interested in ICT and the use of ICT in teaching and learning pedagogy, even though they did not use the term pedagogy. They all used ICT in an innovative manner and were willing to let students explore what the ICTs could do for their learning. Because they were interested in how the ICT could help their teaching they had a positive attitude and were willing participants both in further professional development and sharing what they had learned with the other staff in the school.

During the early meetings of the lead teachers it was clearly explained to them what the purpose of the group was. This clarity of purpose was critical. The lead teachers indicated during interviews that they had appreciated knowing what their role was and were supportive of the lead teacher process. The clarity of purpose, specific tasks for the year also helped to focus the professional development that the lead teachers had received. The targeted professional development was important, it had helped to maintain the focus

of the group, as the DP stated after one such professional development "had got the group buzzing". Thus from the clarity of purpose and directed professional development the group had specific goals.

The leadership of the lead teachers appeared to be important. It was observed during meetings that the group had a clear direction that had explained the purpose of the lead teachers and helped them to set their and the groups' goals. This leadership was often low key as suits a voluntary group but helped to maintain the group's clarity of purpose, restating their goals when necessary.

Lastly the lead teacher group needed to be part of the school's ordinary management structures. When the meetings were part of the school meeting cycle the members of the group gave the meeting dates more importance. Also when the meetings of the group were scheduled in the school's ordinary meeting cycles then clashes with other meetings were reduced as most of the lead teachers had other responsibilties in the school. Lastly this scheduling of the meetings seemed to lend the lead teacher group "kudos" in the school, a level of recognition of the importance that management afforded the lead teacher ICT professional development task.

The key role of the lead teachers is the delivery of professional development. The next section discusses the role the lead teachers took in the ICT professional development carried out in the case study school.

Using lead teachers to deliver ICT professional development

One of the strengths of the lead teacher model is that the lead teachers are on the school site. There are a number of advantages using lead teachers for the delivery of professional development to the school's staff. The following section outlines the advantages that this study found to having the professional development delivered by lead teachers.

Since the lead teachers are practising teachers that are prepared to explore the different applications of ICT to their own teaching, they have a good understanding of how ICTs can be used by students for learning. Therefore the lead teachers are well positioned to deliver professional development that focuses on the application of ICTs to teaching and learning. This sits well with the rest of the school's staff who are largely competent users of ICT, as shown in the staff survey.

Because the lead teachers are on site and have been selected because of their reputation among the staff, the delivery of professional development by the lead teachers is well received by the staff. The lead teachers reported that in the usual informal interactions between teachers they often had discussions with staff about the formal professional development that the lead teachers had been involved in, either delivering or that the lead teachers had received. These informal discussions helped to reinforce any formal professional development that the lead teachers may have carried out. As well, the lead teachers were often approached for brief advice on the use of ICT, just-in-time

advice, an important element in teachers, feeling supported in implementing ICTs.

When planning professional development the lead teachers have an in-depth knowledge of the school, the students and the personalities of the staff. This detailed knowledge means that the lead teachers have a good idea of what is required for professional development in each area of the school. They have worked closely with a department to design a professional development plan that meats the needs of that department. As well, the lead teachers also understand intuitively the most appropriate manner to deliver the professional development to each department in the school. These two factors, individual department plan and knowledge of the department members, meant that effective professional development is delivered to each department of the school.

All of the above factors have meant that the lead teachers have been able to concentrate on the pedagogy of using ICT with students, the real requirement of ICT professional development in schools today (Ham, 2005; McKenzie, 1998 & Moersh, 2002).

Sustainability:

Factors that helped or hindered the sustaining of effective ICT professional development in the year after the cluster

Professional development for ICT was sustained by the lead teachers in the case study school in the year following the cluster. The sustainability occurred in two distinct ways. Firstly, the sustainability of the changes in teaching practice that the cluster had introduced continued, for example the Social Studies and Science departments were observed using units of work that had been developed during the cluster. Secondly the lead teacher group continued to deliver and support teachers professional development in ICT thus the practice of lead teachers was sustained.

The sustainability of the units of work developed during the cluster occurred because the teachers valued the professional development that they had received and had created units of work from that professional development. The units met their needs. Furthermore the changes developed under the cluster were manageable within the resources of the school (Fullan & Hargreaves, 2002)

The support of the school's management team was crucial to the sustainability of the lead teachers' practice. The support of the management lent credibility to the group both in terms of their practice and the task that the lead teachers carried out. Simple tasks such as scheduling the lead teacher's meetings in the usual calendar of school meetings gave the lead teachers validity. Furthermore the extra professional development that the lead teachers had

and time for that professional development to occur could not proceed without the support of the management team.

During the research the lead teacher group evaluated the role of the lead teachers and set a focus for the year, the intranet in the year of the study. This focus gave the lead teachers a sense of purpose. The group was guided through the evaluation process by the group leader who ensured that the lead teachers had clear goals and a collective clarity of purpose. This purpose was different from the focus during the cluster and added to the ecological diversity of the school, another contributing factor to sustainable change (Fullan & Hargreaves, 2002)

Finally the sustainability occurred because there was a natural evolution as the lead teachers took over the role of professional development that the cluster facilitator had led. There was a long term change, sustained change.

Delimitations of Scope and Key Assumptions

However there are two key limiting factors that are outside of the control of the study, they are;

Firstly the school is in a dramatic growth phase, growing by approximately one hundred and fifty students a year. This has meant that the school has employed twelve new teachers in 2004 and fourteen new teachers on 2005. In the Finding's chapter the thesis looked at some the effects the growth of the school has on the professional development requirements of its staff and the structure and membership of the lead teacher group.

Secondly the school has supplied all teaching staff with a lap top computer, which may affect the staff professional development requirements. However as this thesis considers the delivery of professional development the effect of the laptops has not been explored even though it may contribute to staff computer skills.

Conclusion

This research had two main parts, firstly observing and describing the roles that the lead teachers took in developing and delivering ICT professional development and secondly reaching some conclusions about the sustainability of a lead teacher model to ensure the delivery of continued ICT professional development.

The use of lead teachers were found to be an effective method for the delivery of ICT professional development to improve the skills of teachers using ICT with their students. The model was effective because the lead teachers were able to tailor the professional development to the needs of individual departments or teachers. However, to be effective the lead teachers needed to be recognised as exemplar users of ICT and so respected by the staff of the school.

The use of lead teachers to deliver ICT professional development was found to be sustainable for the study school so long as a few conditions were met. To be effective the lead teacher model required leadership and support from

the school's management. This support required that the lead teachers received extra professional development themselves and some time allowance to carry out some of their lead teacher roles.

Thus sustainability did not mean that we did everything exactly the same as it had been under the cluster, but that the general impetus of keeping the ICT professional development beyound the cluster remained part of the schools culture.

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Survey Staff 2005 Term 1

Computer Skills

Please complete the following questions with the column that describes your skills in each area.

Key to Columns

1. I have no skills or limited skills in this area

2. I am able to perform tasks in this area

3. I have skills in this area

	1	2	3
Environment, Windows XP, Network and Laptop			
Open programs as needed	☐	☐	☐
Save and retrieve files in folders as needed (XP)	☐	☐	☐
Create, organise and manage files in folder (XP)	☐	☐	☐
Manage user accounts on own laptop	☐	☐	☐
Save and retrieve files in folders as needed (network)	☐	☐	☐
Create, organise and manage files in folder (network)	☐	☐	☐
Able to use the data display for power point, pictures, movies etc	☐	☐	☐
E-mail -Neomail			
Send and receive mail	☐	☐	☐
Address book, to manage addresses, create groups & send mail	☐	☐	☐
Use tools to manage mail folders and save preferences	☐	☐	☐
School Intranet			
Able to access the school intranet	☐	☐	☐
Load files for student and teacher access on intranet	☐	☐	☐
Able to create pages for use on the intranet	☐	☐	☐
Databases - Classroom Manager			
Enter marks and information for reports	☐	☐	☐
Use teacher columns to make own markbook and analyse marks entered	☐	☐	☐
Word Processing - MS Word			
Edit eg copy paste, find, page set and replace	☐	☐	☐
Format eg fonts, borders, bullet points, columns etc	☐	☐	☐
Inserting eg pictures, dates, annotations, page numbers etc	☐	☐	☐
Using tools eg spell check, auto correct, macros etc	☐	☐	☐
Using tables eg inserting, formatting, sort data, merge cells etc	☐	☐	☐
Spread Sheets – MS Excel			
Edit eg copy paste, find, page set and replace	☐	☐	☐
Formatting eg number format, borders, colour, auto formatting	☐	☐	☐
Charts eg creating appropriate charts and graphs	☐	☐	☐
Formula eg inserting formulas, creating or editing formulas	☐	☐	☐
Data Management eg sorting, reports etc	☐	☐	☐
Presentation Software – Power Point			
Edit eg copy paste, find, page set and replace	☐	☐	☐
Inserting eg slides, art/graphics, movies etc	☐	☐	☐
Formatting eg fonts, bullet points, templates etc	☐	☐	☐
Slideshows eg transitions, animations, build buttons, hyperlinks etc	☐	☐	☐
Web Authoring –MS Front Page			
Handle files eg open, publish and import	☐	☐	☐
Edit eg copy, paste, to do tasks	☐	☐	☐
Using tools eg hyperlinks, web settings	☐	☐	☐
	☐	☐	☐

Comments

Please add any comment about your computer skills

Please add any comment about professional develop that you would like for skills that you need to use ICT in your class

Thank you for your time

Interview – Facilitator (of the cluster 2002-2004)

<u>Warm-up</u>

Describe topic and introduce the main themes for the discussion:

- Description of the cluster and your role in the cluster.

- Description of the lead teacher group from your perspective.

- Your experiences with the lead teacher group and the school.

- The successes of the professional development program.

<u>Background</u>

Why the lead teacher model was was chosen for this school?

Can you explain your role as facilitator for this school?

Was this different from the other schools that you worked in?

  - if so how

<u>Tasks</u>

Can you outline the successes achieved in ICT implementation achieved in this time?

Why do you think these successes occurred?

What do you think the school can do to continue with these successes?

What would you change in the way the professional development was implemented now (the value of hind sight)?

Are there any other comments about the progress of this school in the time it was part of the cluster?

Thank-you

Possible Questions Interview –Deputy Principal (in charge of Professional Development, thus responsible for the lead teachers)

Warm-up

Describe topic and introduce the main themes for the discussion:

Sustainability of Information Communications Technology Professional Development (ICT PD)

Background

Describe the ICT PD worked during the cluster

- Describe your input in to the selection of the lead teacher model

- How doers the lead teacher (LT) model suits the climate/environment at WSC (the school where the research is being undertaken)

- How were lead teachers selected?

- Explain your perceptions of the lead teacher model – strengths/weaknesses

- How does ICT PD fit into the schools Professional Development (PD) programme

- Was there an increased use of ICT in curriculum?

School Development

What adjustments are necessary for the continued ICT PD (since cluster ended)?

What barriers (if any) have you encountered with your use or continued development of ICT?

What factors facilitate the teachers to keep using/developing ICT?

What impact has the Ministry contract and its termination had upon you?

Discussion/Future

Can you identify the strengths and weakness of the lead teacher model for the continued ICT PD ?

What are your opinions about the lead teacher model of ICTPD?

Are there changes you would make to the model?

Are there any comments that you would like to make?

Offer a chance for any further comments, discussion or thoughts

Possible Questions **–Lead teachers**

Warm-up

Describe topic and introduce the main themes for the discussion:

What barriers (if any) have you encountered with your use or continued development of Information Communication Technology (ICT)? What factors facilitate you to keep using/developing ICT? What impact has the Ministry contract and its termination had upon you?

Sustainability of ICT Professional Development (PD)

Background

Why have you consented to be lead teacher?

How long been a lead teacher, involved in cluster (or not)?

Background or skills with in ICT

- personal

- uses with students

Tasks

Where is your dept at with integration of ICT into its curriculum?

Describe what you are doing with your dept?

How is this helping with

- integration of ICT with curriculum

- helping students with higher level tasks

Personal Development

What PD related to ICT are you doing?

What PD would you like to do?

How does PD help with your role as a lead teacher?

Discussion/Future

Can you identify the strengths and weakness of the lead teacher model?

What are your opinions about the lead teacher model of ICTPD?

Are there changes you would make to the model?

Are there any comments that you would like to make?

Offer a chance for any further comments, discussion or thoughts