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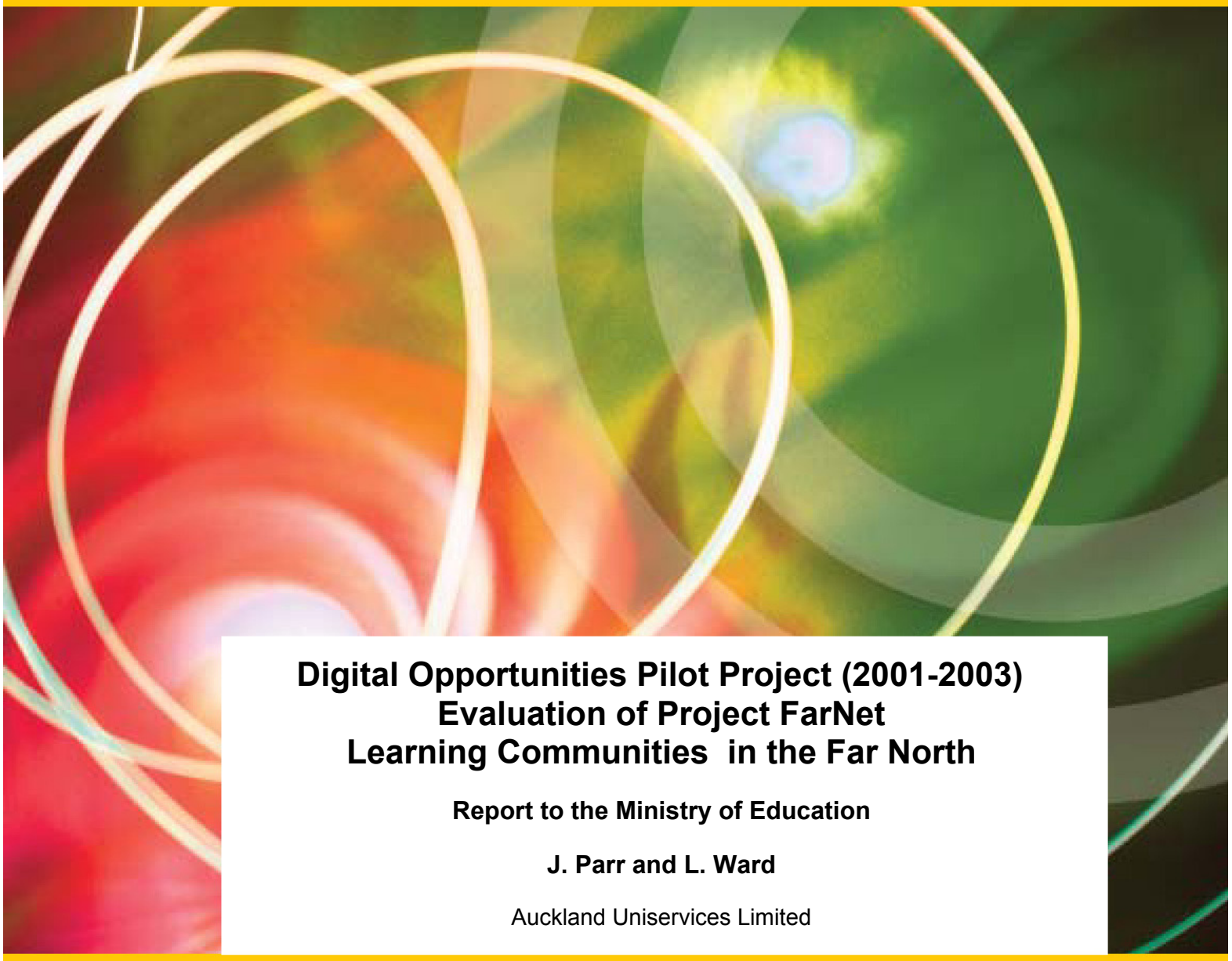

Digital Opportunities Pilot Project (2001-2003) Evaluation of Project FarNet Learning Communities in the Far North

Report to the Ministry of Education

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Digital Opportunities Pilot Project 2001-2003

Evaluation of the Digital Opportunities Project FarNet: Learning Communities in the Far North

FINAL REPORT

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Executive Summary

FarNet was one of four Digital Opportunities Pilot Projects, aimed at "bridging the digital divide" by introducing information and communications technology (ICT) to 10 schools in the Far North. Government, business and schools worked to help remove barriers that make if difficult for schools and students to access and use ICT effectively by increasing the bandwidth available to participants, providing hardware and software, providing quality content to support teaching and learning, and offering related training and professional development to enable this to happen. The aim was to improve student achievement and increase participation, particularly in maths, science and technology. A major way this was to be accomplished in the Far North is indicated in the title of the project in the Partnership Protocol where it is referred to as "Learning Communities in the Far North". The goal was to make good resources available electronically and so make maths, science and technology "come alive" for students. Participation and retention in these subject areas would be increased through virtual schools or virtual learning communities.

This evaluation aimed to examine the assumptions underpinning FarNet; to document the implementation of FarNet; to document changes specifically in terms of access to ICT for teaching and learning resources, confidence with ICT, pedagogy and student outcomes; to identify the resources, skills, and conditions that contribute to effective use of ICT to assist teaching and learning; to examine the extent to which collaboration occurs in resource development and use within and across schools; and to highlight examples of good practice in the use of ICT by students and teachers, and in the development of resources, that stem from the project.

Multiple data sources including NZQA statistics, FarNet website postings, reports and other documents, site visits to schools, interviews with key personnel and self-report questionnaires from all teachers were used to address the evaluation questions.

Assumptions underpinning the FarNet project are critiqued, drawing upon international research literature. These assumptions are: the notion that ICT impacts on achievement outcomes, particularly those measured by national achievement standards; that ICT is a catalyst for pedagogical change to bring classrooms and learning alive; and that a professional learning community can be built electronically.

With regard to major findings, five main themes emerge from this evaluation. The findings associated with these have the potential to impact on similar future projects.

The themes are:

1. The need for shared understandings of what a project entails specifically, what participant's roles are, what the desired outcomes are and, most importantly, how these will benefit teaching and learning both in the short and longer term. Where related projects are operating, synergies need to be forged explicitly.
2. Access to infrastructure has a significant impact on both teacher skill and confidence. FarNet, together with later complementary initiatives, was seen as successful in facilitating greatly increased access. However, any hardware and software must be technically robust and able to be readily integrated into existing systems to facilitate teacher confidence and willingness to use.
3. Professional development offered must move beyond simple "one size fits all" workshops primarily designed for skills enhancement as teachers appear to be a very heterogeneous

group with respect to ICT skills. During the course of FarNet, teacher skill levels reportedly increased markedly. But, teacher goals for ICT professional development, in general, may be limited when the potential of ICT is not fully understood. There is a clear need for a strong pedagogical content in professional development and there was very limited evidence of such. This may partly explain the very modest degree of change in use of ICT in teaching and learning where most change was in relation to planning, preparation and administration. There is a demonstrable need for continuous professional learning (as opposed to professional development) to occur.

4. The creation of a professional learning community is a complex process and a number of factors need to be present before such a community will thrive. These include cultivating a climate where teachers are comfortable to deprivatise practice and accept collective responsibility for teacher and student learning. The proportion of teachers who participated by "posting" resources on the FarNet site was small and virtually confined to curriculum leaders. There was little evidence of widespread use of the resources available, which were predominantly electronic versions of print resources with some notable exceptions. Where communities appeared to operate best in FarNet, for example the community of Maori teachers, they were building on previous links. In other cases they were sustained, albeit in a weak form, by volunteerism. While ICT has the potential to facilitate ongoing professional learning and communication, many of the implementation issues of a professional learning community are compounded when the community is online.

5. A number of factors mean that it is virtually impossible to determine the level of impact such projects have on teaching and learning without sophisticated evaluation methodologies that are still being developed. In the case of FarNet there were other, closely aligned projects. In fact, Digital Opportunities became like an umbrella framework, subsuming other projects. Another issue, in terms of assessing outcomes from projects such as this, is that the lead time is considerable in terms of the project gaining traction. Longer timeframes are suggested before consideration of any more than indicative or tentative trends is warranted.

Section 1: Context

BACKGROUND TO FARNET

FarNet is one of four Digital Opportunities Pilot Projects that aimed to "bridge the digital divide" by introducing information and communications technology (ICT) into various educational settings with the ultimate aim of improving student achievement and increasing participation, particularly in maths, science and technology. The Far North was chosen as an area because the isolated nature of the schools there made it an ideal candidate area for electronic links, yet geographically challenging in terms of bandwidth provision, and because it had been identified as an area requiring support.

It is clear from early background papers and communications, which note that some students are not achieving at the same rates as others, that it was felt that ICT had the potential to attract and engage students. As the press release by the New Zealand Government stated: "The whole idea behind this joint government-business initiative in the Far North is to bring learning and teaching alive." The aim was to help remove barriers that make it difficult for schools and students to access and use ICT effectively and for government, business and schools to work together to this end.

The partners in the Digital Opportunities Pilot Projects agreed that the projects not only involved increasing the bandwidth available to participants and providing hardware and software, but providing quality content to support teaching and learning and the related training and professional development to enable this to happen. A major way this was to be accomplished in the Far North is indicated in the title of the project in the Partnership Protocol, where it is referred to as "Learning Communities in the Far North". The goal was to make good resources available electronically and so make maths, science and technology "come alive" for students. Participation and retention in these subject areas would be increased through virtual schools or virtual learning communities.

DESCRIPTION OF THE PROJECT

At the onset of FarNet, what distinguished the participating schools was their diversity. Some individual school reports, for example, had identified a need for high quality teaching and learning facilities to support the use of technology in curriculum areas, particularly high quality classroom resources (e.g. Okaihau, 1999). Schools were at different points in their receptiveness to and preparedness for technology (ICTPD Clusters Milestone Report 6, June, 2002). One school principal reported: "When we started off we had two computer rooms and a few computers. We were a pretty long way behind." Another had no networked computers prior to FarNet. On the other hand, one school had a well functioning network and a large number of computers. Further, interview comments gave the impression that some schools felt that "one day the computers just arrived", without those on the ground in schools knowing of their arrival and, by implication, being able to prepare for them or even negotiate what was needed.

FarNet implementation basically involved the installation of allocated hardware and software to schools. The level of infrastructure within each school varied considerably at the start of FarNet and some viewed the new hardware and software as a backward step while for others it was a major advance on what they were operating. The area where the disparity was greatest was in Internet access, a key feature of FarNet. This ranged from 100% of computers with access at two schools to one school where only 30% of the computers had access.

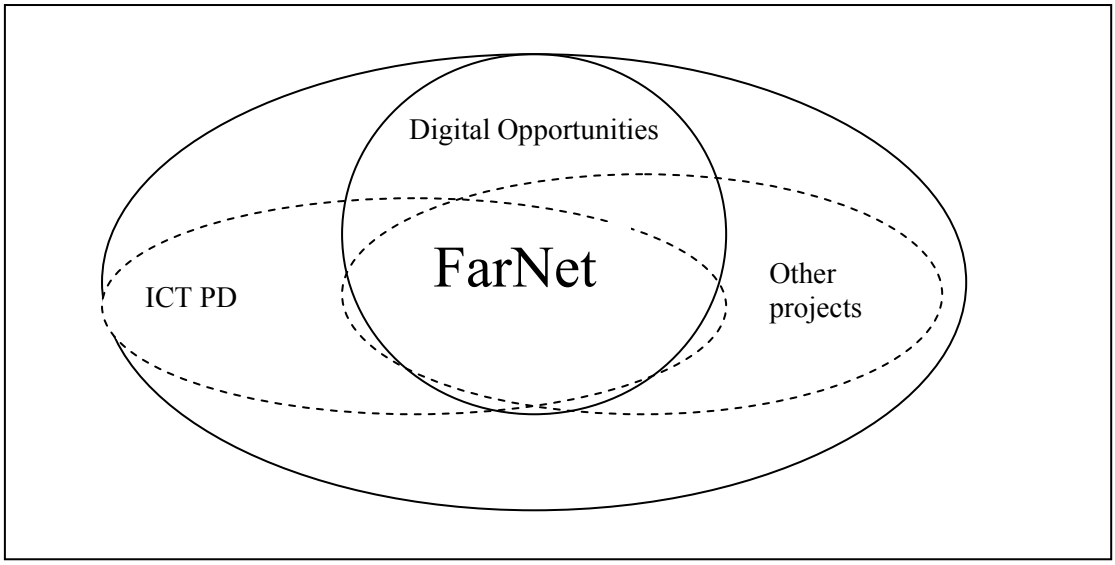
All 10 participating schools received the same allocation, regardless of size or level of infrastructure. The standard package was:

- 128 K access, free connection, 50% off monthly traffic, Safecom (Telecom)
- 1 server, 10 desktops, 1 notebook, installation and training (IBM)
- 1 printer, 1 scanner, 1 SmartTools software package including living library, technical support (Renaissance)
- Data show projector, UPS (Compaq)
- Website, content development (TKI)
- Schools were required to provide cabling and professional development.

FarNet implementation ran a different course and timing in different schools, such that at least one school took over 12 months to resolve issues satisfactorily in order to have the system operating reasonably efficiently. Also some schools adopted the new system (SmartTools) in its entirety while others chose to retain their existing system and run two systems. In some schools, particularly small schools, the same person often had to assume several roles and responsibility for ICT became another of these. Also, in some schools, obtaining relief teachers to enable staff to participate in any form of professional development was problematic.

A related ICT project dealing with professional development of teachers was begun in the Far North in 2001, namely, the ICTPD Cluster Project. All 10 schools in FarNet formed one of the clusters. Okaihau College was the lead school for the ICTPD cluster and its principal at the time, John Locke, was the Director of FarNet. While these two projects initially had different objectives, timelines, milestones and funding, by 2002 they had become so closely linked that both the evaluators and school personnel had difficulty in delineating them. It appears that FarNet was seen as an umbrella initiative that included both Digital Opportunities and the ICTPD contract (Figure 1.1). Other projects include initiatives such as Literacy Leadership and, recently, the Laptops for Teachers Project. While the latter is also an ICT based project, it is not part of either Digital Opportunities or ICTPD and as such must be considered an additional project in the context of this report.

Figure 1.1 Diagrammatic representation of overlaps



Note: This diagram has been adapted from *Korero 1*,[1] p. 4.

An ongoing issue seemed to be the linking of the ICTPD development work with curriculum developments and the integration of the FarNet strategic plan with each school's development plan. Clearly this was a wider issue so a variation to the original ICTPD Contract was negotiated at the end of 2002 to recognise key changes to the clusters project as a result of FarNet involvement. By April 2003, components of the FarNet Strategic Plan were seen as "enhancing and sustaining" the ICTPD Action Plan. These features included:

- extending staff ICT skills and knowledge
- extending teachers' pedagogical skills and knowledge
- resource development and sharing
- developing bicultural materials
- inter-school co-operation
- extending student programmes and activities.

Originally, FarNet had a director, responsible to a Principal's Forum. The director was also principal of the Lead School for the ICTPD Contract. With the resignation of the director from his school, a system of governance was developed for FarNet involving a FarNet Board of Principals with a Chair and an executive. This group worked to develop a FarNet Strategic Plan that recognised both the relatively modest possible pace of development and the need to try to specify what a desired outcome might look like. Other features of the structure of FarNet were: the Ministry appointment of a manager to oversee and report on all of the DigiOpps projects; the appointment of a FarNet co-ordinator, an ICTPD trainer (for a limited period only) and then groups of ICTPD co-ordinators (generally one for each school) and of Curriculum leaders (for each curriculum area and also some special interest groups). In 2003, a Resource Co-ordinator Maori was also appointed.

[1] *Korero* was the FarNet newsletter that was published by the FarNet co-ordinator and sent around all schools. It included information such as upcoming activities and items of interest to the community.

EVALUATION AIMS AND RESEARCH QUESTIONS

Broadly, the aims of the evaluation were to:

- examine the assumptions underpinning FarNet
- document the implementation of FarNet
- document changes with respect to teachers' and students' learning contexts (specifically in terms of access to ICT for teaching and learning resources, confidence with ICT, pedagogy, student outcomes – e.g. achievement and retention)
- identify the resources, skills, and conditions that contribute to effective use of ICT to assist teaching and learning
- examine the extent to which collaboration occurs in resource development and use within and across schools
- highlight examples of good practice in the use of ICT by students and teachers, and in the development of resources, that stem from the project.

The more specific research questions stemming from these aims were:

1. What changes are there in level of teacher confidence with, and extent of use of, ICT, particularly web-based resources, for teaching and for creating curriculum, teaching and learning resources?

   Data pertaining to this question with respect to teacher confidence with, and reported extent of, ICT use are presented in Section 2: Developing ICT Expertise. The development of resources for the FarNet website and the use of this website and its resources are discussed in Section 3, while reported effects on teaching and learning are covered in Section 4.

2. To what extent does development and use of bilingual/Maori resources that have local content, approval and buy-in occur, and how is the bilingual nature of the TKI portal being utilised and being added to?

   To the extent that we are able, the data that address this question largely appear in Section 3.

3. To what extent do patterns of intra-school and inter-school collaboration, co-operation and sharing in teaching and learning, including the development and use of curriculum resources utilising ICT, change during the project?

   The development of resources is discussed early in Section 3 while the notion of a professional community is explored in the latter part of Section 3. This section also presents any material relevant to the role of partners as part of the collaborative enterprise.

4. Have teaching and learning practices altered with the use of ICT, and in what respect? Is there a relationship between teacher beliefs about ICT (particularly ICT resources) and their pattern of use?

   This question is considered in Section 4: Impact of FarNet on Teaching and Learning Practices.

5. How does FarNet (including access to ICT and the use of web-based resources) relate to enhanced student participation (including choice of subject, and retention and achievement rates, particularly in the focus areas of science, maths and technology)?

   Available data relating to this question are presented in Section 5: Impact on Student Outcomes.

EVALUATION STRATEGY

The evaluation strategy aimed to address the research questions through the use of multiple data sources: NZQA statistics, website postings, reports and other documents, site visits, interviews and self-report questionnaires. These are listed below. Further details like timing and frequency, questions asked, number of respondents, and manner of analysis are generally noted at the time the data are presented.

National database data included:

1. For student candidature and achievement levels in the nominated target areas, raw data were obtained from NZQA. These were manipulated and analysed in order to obtain proportional indicators of change.
2. For student retention, school roll statistics, by school and year, were accessed from the Ministry of Education school statistics website.

Data from monitoring of the FarNet website including:

1. The extent and nature of resources on curriculum pages.
2. TKI statistics on use of FarNet website.

Official documents consulted include:

1. The original (confidential) Cabinet briefing papers and subsequent media statements concerning the project.
2. The contract document that schools signed.
3. All available Education Review Office Reports from 1998 and throughout the period of the project 2001–2003 both for the Far North as a region and for the individual schools participating in the project.

Semi-official documents including:

1. Cluster reports submitted to the Ministry of Education by the contract holder documenting progress in relation to the ICT Professional Development Contract goals.
2. Individual school Milestone Reports relating to the FarNet Digital Opportunities Project.
3. FarNet Project Newsletters: *Korero.*
4. Agendas and minutes of meetings from curriculum groups and Principal's Forums.

Self-report questionnaire data from teachers including:

1. Raw data provided from the evaluators of the National ICT Professional Development Project from both 2001 baseline and 2003 final questionnaires.
2. Note: These data are responses to self-report questionnaires from teachers at all 10 FarNet Digital Opportunities schools). (2001 N = 284, 2003 N = 199).
3. Responses to a questionnaire regarding use of Internet and FarNet to supplement the ICTPD data through more specific reference to Internet and FarNet use (N = 221).

Self-report and report on other data obtained at interview (either face to face during a site visit or by telephone). Site visits were made to all schools on one occasion; to two schools on two occasions and to three schools on three occasions. The self-report data includes:

1. Interviews with curriculum leaders (n = 16).
2. Interviews with principals (n = 9 (2002), n = 3 (2003)).
3. Interviews with ICTPD co-ordinators (n = 8).
4. Interviews with classroom teachers (n = 12).
5. Interviews with key stakeholders (n = 3).
6. Focus group interviews with student groups (n = 4).

EXAMINING THE ASSUMPTIONS UNDERPINNING FARNET

Part of the function of an evaluation is to examine the premises that underpin the project being evaluated and to comment upon them and critique them. There are several fundamental assumptions, seen in the discourse surrounding FarNet's launch as discussed above, assumptions which are also reflected in official Ministry policy documents and in the research questions for the evaluation, that can be seen to underpin this project. They are identified below and their logic will be addressed both through literature and through the data from the evaluation.

1. First, technology use and competency is seen as a necessary component of the "knowledge economy", an economy required for a country to compete and advance in the 21st century. Maths, science and technology are core learning areas of a knowledge economy, together with more generic learning outcomes such as the development of higher order thinking skills including metacognitive strategies, problem solving and critical analysis.
2. A further premise is that the use of technology in learning directly or indirectly affects student achievement outcomes or other proximal indicators like retention, attendance, etc.
3. A related premise is that ICT is a lever for change and that use in classrooms effects a change in pedagogy towards one more conducive to enhanced learning outcomes. "We recognise that ICT is important to help us improve New Zealand education" (Speech notes of Minister of Education at the launch of FarNet: Learning Communities in the Far North, 20 September 2001).
4. A final premise, relevant to this particular project, is that a professional learning culture can be built virtually.

In this section we examine literature to show how information and communications technology (ICT) is positioned. We present an overview of the aims and objectives, strategies and policy implications for ICT to illustrate how many of the above assumptions are instantiated in policy. Then, in the second part of this section, we present a summary of findings in relation to ICT and learning outcomes and in relation to ICT and pedagogical change. (An examination and critique of the notion of building a virtual community is in Section 3.)

Objectives, Strategies and Policy Goals for ICT

ICT features prominently in government policy statements worldwide, in various guises. Even where the statements emanate from a Ministry of Education, they are couched in terms of goals for society, rather than simply for education. The implication is that education is the means by which the goals will be achieved. A consideration of the aims and objectives across a number of countries provides some common themes.

Prominent is the notion that ICT will be used in the pursuit of economic efficiency or competitiveness. Frequently this is implied in terms of preparation for the 21st century and meeting the demands of the knowledge age. For example, Icelandic policy states: "Information technology is utilised for the benefit of education and culture to create an advantage for the Icelandic nation in the economy of the future" (Institute for Professional Development and Educational Research, 2002, p. 189). What the needs are for the 21st century, or for a country to be economically competitive, are not always clearly articulated. In New Zealand the link between ICT and the needs of the 21st century (and between ICT and enhanced learning) is made explicit in this statement from the Minister of Education:

> *One of our key education priorities is to build an education system that will equip New Zealanders with 21st century skills. ICT is an incredible tool for learning and ICT skills are essential for work and for life in the modern world (Mallard, 2003).*

As part of this preparation, policy often specifically mentions the gaining of ICT literacy or high levels of technological skill. The Commission of the European Communities wants "digitally literate school-leavers" and the United States wants "all students to have technology and information literacy skills" (Institute for Professional Development and Educational Research, 2002, p. 189). As well as technological capability, the implication is that higher order thinking and problem solving skills are necessary, as is the ability to work co-operatively to solve issues and to be flexible and adaptable in order to meet rapidly changing demands of the workforce. Singapore's policy, for example, talks of "anticipating the future needs of society" and the fact that education should "work towards fulfilling those needs". The policy identifies "thinking skills, learning skills and communication skills" as those skills required for the future (Singapore Ministry of Education, 1997).

Also linked with preparation for the knowledge age is the notion of school reform. New ways of teaching and learning are viewed as necessary to meet the needs of the 21st century. This linking of ICT to school reform is sometimes implicit. However, in many cases, the link is explicitly made. Venezky and Davis, in their summary of findings from 94 case studies, state that:

> *In parallel with educational reform, and sometimes indistinguishable from it, is the ICT revolution. Every OECD country is working to install networks in schools, connect them to the Internet, and ensure a workable configuration of multimedia*

computers, educational software and ICT-savvy teachers (Venezky & Davis, 2002, p. 5).

Singapore sees their plan "for the integration of ICT as a strategy to meet the challenge of the 21st century". The policy implications are seen to include "a better balance between factual knowledge and conceptual skill and the encouragement of more active and independent learning" (Singapore Ministry of Education, 1997). In the United States this linking of ICT to reform is consistent across all state technology plans (Zhao & Conway, 2001). Other examples are Denmark where ICT is seen to allow "the integration of new pedagogical possibilities". In Sweden, ICT is seen to provide the opportunity to turn the school into "a more exciting place for pupils and teachers". Norway views ICT as being used to develop "new studies and assessment methods, new organisations and collaboration methods and new student and teacher roles" while Singapore sees ICT as "generating innovative processes in education" (Institute for Professional Development and Educational Research, 2002). In New Zealand the 2002–2004 ICT strategy focuses on "helping schools to extend their use of ICT to support new ways of teaching and learning" (New Zealand Ministry of Education, 2002).

These policy goals have a striking consistency in that economic rationales related to success in the knowledge age dominate policy. The other two key rationales for ICT are social and educational and are linked, either implicitly or explicitly, to the notion of meeting the needs of the 21st century, the knowledge age. A reformed education system where ICT is an integral part is seen as the vehicle to meet this end.

The implementation of the policy goals takes a similar form across countries, namely: provision of an infrastructure, with funded hardware; the use of lead schools; ICT training for teachers; free or subsidised laptops for teachers; and the development of online resources for teachers. In New Zealand there has been a move within educational policy from learning about to learning with and, finally, learning through technology. The emphasis has moved, therefore, from a skills-based focus to innovation in teaching and learning. The first ICT strategy document was released in 1998 with the goal of building infrastructure and school capability. This was followed in 2002 by the new strategy Digital Horizons: Learning through ICT. This strategy focuses on the challenge of integrating ICT more fully into curriculum practice. The importance of ICT to New Zealand educational policy is apparent through the level of funding provided from the government in a number of initiatives aimed at ensuring ICT is fully integrated into all levels of education and that students and teachers "learn through technology".

The Digital Horizons programmes in schools are clustered into three areas: programmes addressing access, programmes addressing learning and programmes addressing capability. Digital Opportunities, of which FarNet is part, was established in 2001 to assist schools in low decile and/or remote areas to utilise ICT to help overcome issues and barriers related to teaching and learning, and to enhance learning opportunities for students. The four Digital Opportunities pilot projects were broadly aimed at bridging the digital divide. In practical terms, the pilots were also testing a number of technical solutions to e-learning as well as developing the skill base of teaching staff and the repertoire of curriculum material they can access. Full descriptions of the pilots and project reports can be found on Te Kete Ipurangi at http://www.tki.org.nz/e/community/digiops/

The Digital Divide

Internationally there is a wide body of literature concerning the existence of a digital divide (Cattagni & Westat, 2001; Lazarus & Mora, 2000). The underlying message is that technological

developments are widening social gaps and that there is a need to ensure equitable and meaningful access to new technologies. Research in the United States supports the notion of a digital divide, although it may be lessening (Smolenski, 2000). In New Zealand there appear to be similar disparities to those evident in the United States (Maharey & Swain, 2000; Barker, 2001; Doczi, 2000).

As indicated, the core aim of the Digital Opportunities projects was to lessen the divide by providing students of low economic status and those in isolated areas with increased access to technology (Boyd, 2002). Perceived barriers to access and effective use of ICT include low quality bandwidth, limited access to hardware, software and quality content, a lack of technical support and few training and professional development opportunities for teachers about the use of ICT in teaching and learning.

ICT and the Research-Rhetoric Gap

Information and communications technology (ICT) figures prominently in the education policies of governments throughout the world (as shown above) and in most research concerned with the future of schooling initiatives undertaken internationally (Institute for Professional Development and Educational Research, 2002). However, statements made within these contexts appear to be more rhetoric than claims founded in research-based evidence. Much is written about ICT as the hope of education, as something that will turn education around in terms of raising student levels of success, engagement and skill levels. In reality, however, research findings about the effects of ICT and about what is best practice, in relation to the use of ICT in education, are less about evidence than about assertion and belief. As is often the case in education, ideas seem to have rapidly moved from level one research, which is basic research and theory building, to "the professional canon", leaving out the important level two (and level three) research that empirically tests hypotheses (Grossen, 1996 cited in Fouts, 2000).[2]

This part of the section examining the assumptions underpinning the FarNet project illustrates the fact that research is suggesting that only very modest results are apparent in terms of fulfilling policy objectives with respect to student learning outcomes and school reform or teacher pedagogical change. We next summarise key findings from studies on the use of ICT in schools with an emphasis on the impact of ICT on teaching and learning and its place in the classroom.

Impact on Teaching and Learning

Although there have been major advances in the level of infrastructure provided and the level of administrative and professional use, there is little evidence that ICT has impacted on teaching and learning (Becker, 2001; Cuban, 2001; Lai, Pratt, & Trewern, 2001). In fact, several years ago it was claimed that ICT had "barely begun to dent the daily routines of classrooms" (Loveless, 1996, p. 448) and the situation has not changed markedly. For Wood, writing in 2003, "ICT has yet to become 'mission critical' for the vast majority of schools or school systems" (p. 6). Two recent reports from Britain (Becta) that review literature relating to ICT and attainment and ICT and pedagogy (Cox et al., 2003a, 2003b) point out that regular use of ICT is far from common and where teachers do use it, it is probably confined to a limited number of resources and applications and that regular use may be only a few minutes use by individuals.

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[2] Ellis and Fouts proposed a three level classification system to help in evaluating the evidence behind the statement "the research says…": Level I theory building, Level II testing the theory, Level 3 replicating results in large scale studies and school wide implementation.

Many are asking, as Larry Cuban (1986; 2001) does, whether ICT is yet another innovation in education that has failed to reach its potential, whether computers in education are, indeed, "oversold and underused". David Wood in his Think Again Report (2003) noted that European countries shared concerns about growing demands to demonstrate value for money given the investment in infrastructure and professional development of teachers. He further notes that these concerns "raise crucial and largely unresolved questions about the expectations and promises we should be holding for the technology and about the evidence we will need to assess whether or not such expectations are being achieved" (p. 3). Providing an answer to the question of impact in terms of both learning outcomes and pedagogical reform is not straightforward.

For numerous reasons, it is extraordinarily difficult to answer, for example, a seemingly simple question like "Does the use of computers aid learning?" Research on the impact of technology on learning is still relatively recent but, more so than with respect to other innovations, we are researching a moving target, given both the pace of technological change and the fact that the introduction of technology to an educational setting is an ongoing, evolving process.

Equally problematic with evaluations of technology is the fact that it has been often treated as an undifferentiated variable and, further, as an independent variable. Technology is only one of a large number of factors that impact on student learning at any one time. In the case of this evaluation, FarNet was only one of numerous schooling initiatives in the Far North and several of these initiatives shared goals. Even when considering programmes concerned with technology implementation alone, it remains impractical to isolate any one factor. As a result educational research is constantly critiqued both on the basis of confounding and on a lack of recognition of the interaction between technology features, the actions of the persons using it and the impact of the context in which it is being used. It is a case of "damned if it does and damned if it does not".

Further, research concerning technology has often suffered from poor design and poor measures of outcomes. There is a large amount of research that varies in method and treatment (and quality), rendering it difficult to synthesise. Finally, contributing to the difficulty in answering the question is the lack of clarity in research as to what the goals for ICT are specifically, and what the learning processes and outcomes associated with those goals are that could be measured.

These issues notwithstanding, research has attempted to evaluate the relationship of ICT use to aspects of student achievement. The relationship between increased technology usage and increased learning as measured by standardised tests has been studied often. In short, there is quite often a positive relationship (generally modest) but sometimes no relationship.

An issue in consulting a large body of literature is the varying ways in which the research reports the outcomes of using computers in learning. In order to attempt to make sense from the diversity of types of statistics contained in different research reports a measure is often used that allows different types of information about effects to be converted into a common measure of effectiveness, namely, an effect size. The use of effect size allows the combining of results from multiple, similar individual research studies (in this case concerning the use of computers to assist learning) to generate a single effect size that illustrates the treatment effect across all studies. It provides a common expression of the magnitude of study outcomes (even if different measures of outcomes are used in different studies). Also, comparisons of quite different types of innovations in learning, like the use of reinforcement, parent involvement in the school and the use of peers in learning, can be made.

Computer use in instruction has been the subject of several major meta-analytic studies (e.g. Christmann et al., 1997; Fletcher-Flinn & Gravatt, 1995; Kulik, 1994). Basically, the average effect sizes reported range widely, between –.42 and .64. The effect sizes are uneven across educational levels and subject areas. Generally, at primary level, the effect sizes are larger than for secondary (the latter tend to be around .20), while maths and science (highest effect size reported) tend to show greater effect of computer use than English (lowest effect size reported). To date there is no finding of differences according to type of use and there are mixed results with respect to changed effect sizes over time (the latter also tending to represent different use, namely CAI versus multimedia and Internet applications).

There is the question as to what is a reasonable effect size in terms of classroom significance. This is a difficult one. Cohen (1977) provided the following ranges for mean effect size interpretation: effect size (ES) .2 to .49 = small effect; ES .5 to .79 = medium effect, and ES .80 and above = large effect. Tallmadge (1977) suggests that an effect size of .25 or more is educationally significant.

There is, however, evidence of what size of effect can be expected in relation to educational innovations. Hattie (1990; 1992; 1999) reported a synthesis of 337 meta-analyses: 200,000 effect sizes from 180,000 studies representing more than 50 million students and covering almost all different types of innovation in education. His conclusion was that most innovations introduced to schools improve achievement by, on average, .4 of a standard deviation. This provides a benchmark figure by which to judge effects, in this case, those related to technology, as the benchmark is based on the effects of actual educational innovations. The findings for secondary levels of education suggest that computer use is less effective than the average innovation in education.

In a more recent review that did not employ meta-analysis, Sivin-Kachala (1998) assessed the effect of computer technology on learning and achievement by analysing 219 individual research studies conducted from 1990 to 1997 across all learning domains and all learner ages. He reported that a) students in technology rich environments experienced positive effects on achievement in all major subject areas; b) students in technology rich environments showed increased achievement in preschool through higher education for both regular and special needs children; and c) students' attitude towards learning and their own self-concept improved consistently when computers were used for instruction. However, he acknowledged that the level of effectiveness of educational technology is influenced by the specific student population, the software design, the educator's role, and the level of student access to the technology.

The points about level and type of use are amplified in two recent large scale studies of the relationship between use of technology and performance on national tests, both of which show positive effects for technology. One was undertaken in England and relates specifically to secondary students (British Educational Communications and Technology Agency, 2001). This large scale ex post facto study is based on whole school data and considers the relationship between level of resourcing in ICT and student achievement outcomes on national tests.

The study found that secondary schools with "very good" ICT resources (based on inspector's ratings) achieved, on average, better on national tests in English, maths and science (Key Stage 3 tests) than those with "poor" ICT resources. What is of even more interest is that there was no difference between those with "very good" ICT resources and those with a satisfactory level, suggesting there is a threshold level of ICT resources needed for effective use in supporting curriculum learning. Once this was reached, there was not such a pronounced relationship between resources and improved results. Also, schools with the lowest achievement showed less benefit or,

at least, less immediate benefit, following an improvement in ICT resourcing, suggesting that there is a time lag between achieving satisfactory resourcing levels and an improvement in student achievement. In order to eliminate the possible confounding of socio-economic factors, like were compared with like in this study.

Wide use and student levels of skill with ICT were also significant factors. There was evidence that the more widely a school used ICT, the better its results. Impact of ICT was stronger where a particular subject use of ICT was supported by use across the curriculum. There was a strong link demonstrated between students' ICT attainment and the achievement standards, a relationship that held even when socio-economic level was taken into account. Finally, whether good ICT teaching was influential was considered, using a smaller sample of schools. This analysis showed that the results from schools with good ICT resources were enhanced by good ICT teaching. These findings were seen as preliminary, given they were based on a small sample.

The recent review of ICT and attainment that Becta commissioned (Cox, Abbott, Webb, Blakely, Beauchamp & Rhodes, 2003a) concludes that there is "substantial" evidence of positive effects of ICT use particularly in the core subjects of English, maths and science. The report notes that the effect is greatest for those ICT resources that have been integrated into practice. It is partly that the amount of published evidence is greatest for those areas where ICT resources have been around and entered into teachers' practices for some time.

Specific uses of ICT are implicated, in student achievement, where the use is closely related to the learning objectives. For example, in maths, effects are most evident through measures that take account of the specific skills involved and in science, similarly, measures that relate to specific interactions or tasks like those promoted by a simulation environment show most reliably effects on science attainment. The evidence of positive effect is found where the research methods have been specifically designed to relate to the particular type of learning experiences promoted by the use of ICT, that is where there is a match between the measures used to measure likely gains and the nature of the learning.

The second large scale study is from the United States and focuses on maths achievement. Wenglinsky (1998) was concerned with the relationship between maths achievement on the National Assessment of Educational Progress (NAEP) test and key indicators of computer use. The four key indicators of computer use were (i) student access to computers in school for maths related tasks, measured by frequency of use, (ii) student access to and frequency of use of computers at home, (iii) preparedness of maths teachers in computer use, in terms of professional development in computer use, and (iv) the ways in which maths teachers and their students use computers, basically whether the use is for higher or lower order thinking skills. The study controlled for aspects of the social environment of the school including socio-economic status, class size, and teacher characteristics as well as using principal's reports on lateness, absenteeism and morale. Thus, any relationships found represent the value added by technology. The report describes technology uses among 6627 fourth graders and 7146 eighth graders.

Using structural equation modelling, the study tested a model of how various technology characteristics might be related to various educational outcomes. The results show that technology does matter to educational achievement but the important moderator is the way it is used. Level of use does not matter but whether it is used for tasks employing higher order concepts is related to achievement. The analysis found that the students who used simulation and higher order thinking type software showed gains in maths scores of up to 15 weeks above grade level on the NAEP. An

interesting finding was that students who used drill and practice technologies performed worse on the NAEP than students who did not use such technologies.

This study, too, has methodological limitations, in that because there is no prior measure of maths achievement, the direction of effect is unclear. It may be that positive educational outcomes are conducive to certain types of technology use rather than the other way around.

It is apparent that how one evaluates or interprets research dealing with outcomes from use of technology is partly dependent on what one accepts as adequate research. But, perhaps, more importantly, it depends on what are regarded as acceptable outcome measures. The ICT and Attainment report (Cox et al., 2003a) talks of empirical evidence of the role of ICT in educational attainment as the Holy Grail of some researchers and many policy makers! For most at the level of policy or politics, attainment does not equate to improvement in very specific mathematical or science skills or more generalised higher order thinking skills but, rather, equates to a generalisation of that learning to improved performance on national assessment measures. Wood (2003) talks of tensions created by needing to obtain a balance between goals related to enhancing key knowledge and skills and the goals of enhancing critical thinking, innovation and self regulation. He extends this idea with the notion of alignment, particularly between present educational objectives and traditions of assessment and the fact that "any beneficial impacts of ICT and new pedagogical practices on learning can only be expected when the constraints imposed on the teacher-learner relationship by institutional goals and practices are brought into alignment with those required for innovations in practice." (p. 4).

It is small wonder that there is, as yet, no clear consensus about impact on student learning as evidenced in achievement outcomes. To illustrate, some recent sources are quoted that suggest no positive outcomes. One research review undertaken by the Laboratory of Comparative Human Cognition found that "no quantum leap in educational achievement can be associated broadly with the inclusion of computers as instructional media in standard classrooms" (cited in Alton-Lee, 2003, p. 71). Similarly, Cuban (2001) concludes "there have been no advances (measured by higher academic achievement of urban, suburban or rural students) over the last decade that can be confidently attributed to broader access to computers" (p. 178). The Becta review on ICT and attainment (Cox et al., 2003a), while concluding substantial evidence of positive impact, points out that of the 30 years or so of studies into the effect of ICT on attainment, it is often the case that studies report limited evidence of increased attainment while, at the same time, the researchers indicate that "fundamental but hard to measure change" may have taken place. These researchers suggest that if evidence of ICT positively impacting on student achievement is to be convincing, it will take time to amass the evidence. The implication is that we are not there yet. It may be that we are at the stage "to conclude that we now have enough evidence to conclude that, for the present and the foreseeable future, no such evidence of dramatic, context-independent impacts will be forthcoming" (Wood, 2003, p. 12).

Thus, the assumption underpinning FarNet that the use of ICT will enhance student achievement, particularly as evidenced in national qualifications, is clearly far from a given. The expectation of establishing a relationship is even more problematic given the relatively short timeframe in which it could be considered there were "good" levels of resources available in this project. A further assumption of the project is that ICT use will act in some way to change pedagogy towards a more effective form in terms of student engagement and learning. In the following section we consider how aspects of use relate to outcomes.

Technology and the Classroom

The controversies alluded to above, especially the comparison of computer versus non-computer environments, led Means and colleagues to write:

> *The accumulation of comparative studies, biased in their choice of control groups or outcome measures, does little to help us understand what features of the treatment are critical for producing the desired effects. (B. Means et al., 1993, p. 76)*

The more recent findings from the studies discussed above in the United States and Britain are useful in suggesting that certain levels and types of ICT use are associated with positive outcomes. This illustrates what many have said, namely, the fact that, ironically, perhaps the most accurate answer to the question of whether ICT enhances learning and leads to improved outcomes is "it depends". This answer arises partly from an acknowledgement that a complex array (and interaction) of factors impact on student learning at any one time with a central consideration being what is done with the technology and also from the fact that whether there is an impact may depend on how one chooses to define (and measure) impact.

With respect to impact, there is a strong element in the policy literature (see Section 1 above) and in some of the research literature (e.g. Papert, 1998) of ICT as a change agent. Some like Means (1994) see technology as a central component of a new educational paradigm involving a reconceptualisation of teaching methods, curriculum and student outcomes. The notion is that technology will change classrooms over time and that ready access to computers can be instrumental in altering the nature of schooling experienced by students. However, some sources (e.g. Venezky & Davis, 2002) argue that technology is not a catalyst for change but rather a lever to bring about change.

Recent literature on ICT and pedagogy, like that reviewed in the BECTA piece (Cox et al., 2003b), concludes that teachers' pedagogy and pedagogical reasoning influences their uses of ICT and so the attainment of students. Teachers' pedagogies influence the selection of the ICT resource, the planning, the way the resource is used, including the role of the teacher and the level of integration. The review adds that beliefs teachers have about ICT, including its potential and scope, its new ways of knowledge representation, together with their beliefs about how students learn, will affect how they deploy activities for learning. However, it seems that the actual pedagogy associated with the use of ICT to support subject teaching and learning is still evolving, so we are again considering a moving target.

The first large scale evidence of change in the teaching and learning context and interactions in that context came from the Apple Classrooms of Tomorrow research where there were technology rich classrooms (e.g. Sandholtz, Ringstaff, & Dwyer, 1997). Numerous evaluations over time showed some positive and some mixed results. Overall, it was claimed that there were changes in the roles of teachers and students, increased motivation and self-esteem for students, increased success of students at more complex tasks, increased collaboration and increased communication skills but no evidence of improvement on standardised tests (Baker, Gearhart, & Herman, 1994). It was argued (this issue was explored in the previous section) that standardised measures used to address the question of gains in learning outcomes do not actually measure the type of learning that a computer enhanced environment could support (Rockman et al., 2000).

New ideas, particularly socio-cognitive or social constructivist ideas about how children learn, are seen to be congruent with technology in teaching and learning. Technology can support interactive environments in which students learn by doing, receive feedback, refine understanding and build

new knowledge. Technology can be employed to help students to visualise difficult concepts and so aid conceptual understanding. Access to vast amounts of information can be provided, as can connections to other people and support for ensuing collaboration and social interaction around learning.

The role of technology in supporting an environment in which quality teaching can occur is particularly significant in light of current thinking about what educational achievement is and what contributes to educational achievement. In the Ministry of Education report, *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*, educational achievement is seen as encompassing "achievement in the essential skills including social and co-operative skills, the commonly held values, attitudes to learning, and behaviours and other outcomes demonstrating the shared values" and includes "cultural identity, well-being, whanau spirit and preparation for democratic and global citizenship" (Alton-Lee, 2003, p. 13). Arguably, such educational goals are not measured by traditional standardised testing.

Further in this vein, the single most important factor impacting on student achievement is quality teaching. Research shows that "up to 59% of variance in student performance is attributable to differences between teachers and classes" (Alton-Lee, 2003, p. 3). It is important to link features of quality teaching and use of computers to create such environments. Ten characteristics of quality teaching are offered by Alton-Lee. ICT features in one of these relating to the aligning of curriculum goals, ICT use, task design, teaching and school practices. According to Alton-Lee, the use of ICT in quality teaching is one that "effectively integrates the use of ICT-rich environments into pedagogical practices that support student learning" (Alton-Lee, 2003, p. 71). It is the pedagogical practices that are seen to support learning and ICT is part of those practices.

However, research on teacher practices and ICT suggests that ICT is being used to strengthen current practice rather than change teacher practice (Cuban, 2001; Girod & Cavanaugh, 2001). In this case, the extent to which technology enhances learning will depend on whether current practice is consistent with quality teaching. Where current practice is not consistent with quality teaching then ICT *may* be the lever needed for reform to occur. Alone, however, it will not act as a catalyst for change or for improved teaching and learning. Thus, the assumption underpinning FarNet that the use of ICT would lead to enhanced learning through changed pedagogical practices understates the complexity of the relationship.

Section 2: Developing ICT Expertise

The developing of ICT expertise had begun before FarNet was launched in that the FarNet schools, as noted above, were already part of an ICTPD cluster in 2001 aimed at enhancing teacher ICT skills. During 2003 the initial Laptops for Teachers initiative (STELA) was also introduced with associated professional development expectations. Any changes in teacher knowledge and/or skill related to ICT therefore need to be seen as cumulative and attributable to any one or, more likely, a combination of the above. That is, it is likely to be the result of the layering and interaction of these programmes. Improved access to technology has also had an impact that should not be underestimated. For many teachers FarNet was associated with the provision of more hardware and the enhanced access that stemmed from this. Reports from all sources agree that there has been a considerable increase in the levels of teacher expertise over recent times. As one respondent stated, "*people have come so far*". It was his view that "*without [FarNet] they wouldn't have*".

This section, therefore, looks in general at the professional development undertaken in the schools that may have been under the auspices of any of the above projects. It considers the reported level of teacher expertise with ICT; their use of ICT and the perceived impact ICT has had on the schools generally. It uses data from both the baseline and follow-up ICTPD surveys designed and sent by the ICTPD Evaluation Team (n of schools = 10; n of teachers = 284; n of schools = 9; n of teachers = 199, respectively), together with interview data from ICT (PD) co-ordinators (n = 8) or curriculum leaders (n = 16), subject teachers (n = 12) and information reported in individual school FarNet and ICTPD Cluster Milestone Reports.

INVOLVEMENT IN PROFESSIONAL DEVELOPMENT

In the final ICTPD cluster questionnaire participants were asked to indicate, on a timeline, the length of time they had received active ICT support as part of the ICTPD cluster in the Far North. Their responses were grouped into six categories for analysis. Table 2.1 shows the frequencies for each of these categories.

Table 2.1 Period of time participants received active ICT support

No. of months	% of participants	Cumulative %
0–6	14.3	14.3
7–12	21.4	35.7
13–18	5.0	40.7
19–24	17.1	57.9
25–30	16.4	74.3
31–36	25.7	100.0

The majority of participants received two years or less of active support from the ICTPD programme with 58% of all participants in the 19–24 month category or lower. Only 25% of all participants were in the programme for the full three years. There are a number of possible explanations for this finding. It may be at least partially explained by teacher loss in the Far North. However, it may also be that formal professional development was only undertaken in discrete blocks of time depending on the school. A third explanation is related to how teachers actually define professional development.

Anecdotally, teachers and management spoke of the problem of both retaining and finding new staff, although there was a sense that this was improving. One respondent commented that the Far North was no longer considered a "hard to staff" area, although another spoke of a shortage of

Heads of Department in the area. The issue of teacher loss and turnover may have had an impact on the ability of the ICTPD co-ordinators and trainers to move forward to more advanced skills and ideas as they would have been constantly faced with changing personnel and, potentially, a need to start again. There are also implications for the development of a professional community as turnover probably interferes with the development of relationships and associated trust and norms of behaviour. An analysis of variance (ANOVA) showed that there were no significant differences between schools in terms of length of involvement ($df = 8$, $F = 1.961$, $p > .05$). So, if loss of teachers contributed to an average time for active PD below the length of the contract, then schools lost teachers equally. Teachers may have been lost from the Far North, although there is some anecdotal evidence of teachers moving within schools in the Far North.

An alternative explanation of the lower average time for active PD is the idea that PD occurred in blocks of time (and clearly, also the implication can be drawn that the extent of these blocks was not significantly different between schools). An example of the discrete blocks of time can be seen in one school where there was initially one hour per week after school dedicated to ICT professional development. However, this had subsequently been replaced by another programme. The Milestone Reports from schools suggest that several had regular weekly PD for varying periods of time. However, at another the school the suggestion from interviewees was that there had not been a lot of dedicated time.

The third possibility in explaining the relatively low average time for active PD concerns how PD is defined. One of the issues in attempting to determine the extent of professional development is the, arguably, limited view many teachers have of exactly what constitutes professional development. It is apparent from interviews that for many teachers informal professional learning is not considered professional development. One teacher spoke of how professional development was undertaken in compulsory workshops after school. She differentiated this from the more informal peer-supported learning where teachers helped one another as needed. This view is supported by comments from senior management at a school. His staff, he stated, would not see having to learn how to use Classroom Manager for their reports as professional development because it had not occurred in a dedicated time. He explained this further by stating: "*Give them a day off to go to a course and they know they have **done** professional development.*" Another respondent commented, somewhat tongue-in-cheek, that the general view of professional development was "*getting into the car, going to Whangarei and having a nice lunch*". The effect of this narrow definition is to underestimate the extent of professional development undertaken in that teachers may have indicated only the amount of formal, more traditional styles of professional development, namely, dedicated workshops.

GOALS FOR PROFESSIONAL DEVELOPMENT

Participants were asked to list three or four goals they had at the start of the ICTPD project and to indicate how well these had been achieved on a scale of 1 = not achieved, 2 = partly achieved and 3 = fully achieved. They had also been asked in 2001 to list their goals for the project. There were a total of 318 goals listed by the 201 respondents, which suggests that the majority provided only one or two goals.

Their responses were coded deductively into a number of categories, which were then coded to a second level where necessary. Table 2.2 shows the results from the first level of coding for the 2003 data. The majority of respondents (58%) wanted to improve their own skills. The second level coding for this category is discussed and displayed in Table 2.3.

Table 2.2 Goals for ICTPD in 2003 survey

Code	Number	% of total
Own skills	186	58
Administrative	41	13
Integration	36	11
Resources	32	10
Other	14	4
Professional	9	3
Total	**318**	

The second most frequently used category was administrative use (13%), which included as responses descriptions such as:

- gains in Classroom Manager competency
- be able to add information to the school intranet
- be able to keep all my documents and marks and details in my drive.

Integration of ICT into classroom practices, the third category, only accounted for 11% of all goals followed by the development of resources (10%). All items coded as integration referred directly to the use of computers with students or in the classroom in some way. Items coded as integration included:

- instruction of students in use of Internet as a resource
- familiarity with using the computer for classroom activities
- use technology to create greater relevance for students in teaching mathematics
- to gain confidence to assist students in specific classes.

These findings are consistent with the national picture in that the same three goals feature in the overall data. Approximately half of the respondents nominated technical skills as their main goal across all four years of the ICTPD programme (1999–2003). A further quarter nominated classroom or student use while around 10% nominated administration, preparation and planning (Ham & Graham, 2004). While the evaluators for FarNet determined their own coding from the responses to open-ended questions, this suggests a congruency between the FarNet picture and the wider national picture.

Of those responses that were coded as resource development only six directly referred to FarNet, while a further eight referred to the Internet. Statements coded under this category include:

- produce attractive student worksheets
- develop resources for other schools
- utilise FarNet website for resources
- increase skills in resource making.

The professional category included a range of items related to the professional work of the respondent. Items within this category include:

- to access and use Leadspace effectively
- to be an independent learner
- use email for professional communication.

Within the category Other were responses related to learning about FarNet (4), helping other staff to use computers (6), student achievement (1), technical knowledge (1), and learning about the future of ICT (1).

The emphasis on the improvement and development of individual skills could be due not only to a low entry skill level for many but also a limited focus in terms of the potential use for ICT. Few respondents mentioned as goals integration or use for classroom practices or the development and sharing of resources, both of which were central aims of FarNet. This suggests either that teachers did not share these FarNet aims or that such goals were too far removed from their perceived current level of competence and pedagogical understanding. It may also be that they believed that a prerequisite of integration is the development of personal skill and confidence. Regardless of the reasoning, the inference is that these teachers were not entirely ready for what FarNet implied.

The own skills category was coded at a second level to determine the areas in which respondents wanted to develop skills (Table 2.3). The most frequently cited skill area for development was in the use of the Office Suite: Word, Excel or PowerPoint (32%). Comments within this code included:

- *advanced PowerPoint*
- *typing and printing documents*
- *make tables/worksheets etc efficiently using a wide range of applications.*

This was followed by a general skills category (12%), which was a composite category including comments such as:

- *to develop personal ICT skills*
- *to be effective in the use of programmes*
- *upskilling in what is necessary for my area.*

The third category was use of the Internet (and intranet) (11%) and included responses such as:

- *learn to upload onto the net*
- *use the network confidently*
- *familiarity with the Internet.*

The remaining 45% of comments were spread across 17 different categories, which ranged from improving keyboarding skills through to the use of multi-media programmes such as I-movie and video-conferencing. A sample of items from this category includes:

- *I-movie – using, editing, final product*

- *using laptop effectively*
- *touch-typing skills*
- *learn Macromedia and Dreamweaver*
- *be overall computer literate in my area.*

Table 2.3 Sub-categories of improving own skills

Code	Number	% of total
Office suite	60	32
General	22	12
Internet	20	11
Email	12	6
Data show	11	6
Software	10	5
Basic	8	4
Multi-media	7	4
Web	7	4
Laptop	6	3
Intranet	5	3
Keyboard	4	2
Confidence	3	2
Literacy	3	2
Instructor course	2	1
Video conferencing	2	1
CDs	1	1
Conferencing	1	1
Databases	1	1
Windows	1	1
Total	**186**	

These data suggest that there was a wide range of both expectations and skill level among the participants at the beginning of the ICTPD programme. For some it was seen as a chance to develop high level multimedia skills, while for others it was a starting point for their use of computers. This would have made it difficult for any professional development co-ordinator to meet the needs of all staff.

The extent to which participants felt their goals had been achieved is shown in Table 2.4 by first level coding category. This shows that for all categories the majority of participants felt that their goals had been at least partly achieved. Those participants whose responses were coded into the professional category were most likely to state that their goals had been fully achieved. Those whose responses were related to resource development were the least satisfied, which is of concern given the focus of FarNet.

Table 2.4 Percentage of participants at each level of achievement by coding category

Category	Not achieved	Partly achieved	Totally achieved
Professional	11	33	56
Integration	6	42	53
Administrative	7	44	49
Own skills	11	42	46
Other	7	50	43
Resources	16	44	41
Total	**10**	**43**	**47**

Participants were also asked to what extent, overall, the ICTPD programme had met their expectations on a scale of 1 = exceeded, 2 = fully met, 3 = largely met, 4 = partially met and 5 = not met. The overall mean level to which expectations were met was 3.25 (approaching largely met). Only 7% of respondents felt that their expectations had not been met at all, while 5% felt that they had been exceeded. An ANOVA showed no significant differences between schools in the mean level to which expectations were met ($df = 8$, $F = 1.504$, $p > .05$).

The overall result suggests a high level of satisfaction with the ICT professional development delivered within the FarNet schools, given the goals of the staff. These goals, however, were somewhat limited and not necessarily directly related to the goals of FarNet. Teachers wanted largely to improve their own skills and the vast majority either partly or totally achieved this aim. As the following section shows, while there were some activities specific to FarNet, such as training in Manila and SmartTools, subject-based meetings to create resources and attendance at conferences, most of the professional development was more related to the ICTPD contract goals of enhancing teacher skills in the use of ICT.

DESCRIPTION OF PROFESSIONAL DEVELOPMENT

The ICTPD Co-ordinator

Each school had an ICTPD co-ordinator who was initially responsible for the provision of the ICTPD programme in the school. However, with the advent of FarNet this person also often became the liaison for the FarNet project within his/her school. This duality of roles further confounds the ability to separate the projects. The interviews with these teachers illustrated clearly what a key role they had, one that required "clout", often in the form of support from the principal. The role was also seen to require good interpersonal skills but not necessarily "*guru level*" ICT skills. Some co-ordinators nominated the need to be familiar with applications and to possess some technical skill. One thought it helped to have "*a bit of pedagogy knowledge*". The role was seen to encompass many tasks and to involve being accessible: "*If you are going to introduce new things into a school, you have got to have somebody who is pretty much around all break and lunch*." As one co-ordinator said, "*I thought my job was going to be quite small but it is not*."

Type of Professional Development

Schools were encouraged to identify their teachers' needs in ICT and to design, with the help of the FarNet co-ordinator and an ICT Facilitator, school-based programmes to meet these needs. The ICTPD Project provided funds for curriculum resource development, attendance at conferences and to support ICTPD strategies adopted in each school. The common components of school based programmes were deemed to be training with the equipment, becoming familiar with the core

computer applications for teaching and learning and the development of teaching resources to use with students. Teachers gained a "bronze" award by demonstrating a basic level of ICT competency and a silver award for sending a resource to be posted on the FarNet site. The pounamu award was for sharing a resource for placement in Te Reo Maori. There was training for the Renaissance software SmartTools while the self-pacing training software, SmartForce, was purchased in 2002 to enable online learning. SmartForce online training software was available to support training staff on core ICT applications. However, by June 2002, only three schools had it installed and reported using it.

From the Milestone Reports, descriptions were gleaned of largely application and skills based training. Learning to use applications was seen as useful "in both presenting concepts to students and as a vehicle for students to present their own work" (Okaihau Milestone 2, March 2002). Generally, the ICTPD took place on individual school sites and catered for members of individual schools, although there were occasional across-school groupings for workshops. Mostly, schools arranged regular workshop type meetings. For example, Okaihau report staff trained progressively in equipment and application use in 2002 using a voluntary after school programme fortnightly, with some lunchtime sessions for small things like how to burn a CD. The co-ordinator had a time allocation that allowed visits to classrooms. Information was also imparted electronically. Broadwood reported general computer training weekly and one on one training for FrontPage with the FarNet training person. Bay of Islands College used Community Education classes as one means to upskill staff in applications. Panguru reported a one hour a week session taken by the Principal. At Whangaroa, in mid 2002, two-thirds of the staff had a bronze award. They hired an outside consultant who worked with the staff on site for six weeks. Kerikeri was a school that had already taken huge strides in ICT before FarNet, initiating a staff professional development project in 2001 that entailed regular after school meetings where staff largely worked with peers. Kaitaia in 2002 focused on technical training, including SmartTools, Word, Excel, PowerPoint and Classroom Manager, what the principal described as "pretty basic stuff". Kaitaia was a later cab off the rank for a number of technical reasons and the first whole staff PD was in September 2002. Opononi wrote of staff training on the use of software for NZQA reporting and senior reports that was to be followed by workshops on "good ICT practice in curriculum delivery" (June 2002).

The latter notion, practice, was a focus at Taipa, which was somewhat of an exception in terms of the focus for ICTPD. There, the "professional development strategy remains focused on improving staff pedagogical practice". Staff worked on cross-curricular constructivist units for self-paced student use utilising Team Solutions personnel, along with in-school based expertise. By the latter half of 2002, they had posted a number of individualised webquest type units on their intranet, including units in biology, social studies, science, technology and maths.

With respect to developing curriculum resources for FarNet, work had begun towards the end of 2001 with schools sending representatives to attend meetings with other teachers to plan resource development or to meet with the Learning Centre Trust. Each curriculum leader was trained in the Userland Manila-Frontier software, used to post resources on a community page (over 41 individual sessions with the 25 curriculum leaders to do this are reported in ICIPD Cluster Report 7, October 2002). The FarNet co-ordinator and FarNet ICT contracted trainer provided workshops in the second half of 2002; for example, three sessions on online learning, specifically, developing webquests, and a session on video editing software and a session on RM SmartTools systems. The contracted ICT trainer conducted 27 sessions in eight of the schools, concentrating on "intranet and Internet website development using FrontPage to develop each school's expertise and the

understanding, use and management of the intranet in each school" (ICTPD Cluster Report, October 2002). This work continued focusing on four schools in term 4, 2002.

A major feature of the PD in ICT in 2002 was the attendance at the NavCon2K2 (Navigators Schools) conference in July 2002 in Christchurch (4 principals, 12 curriculum leaders, 6 ICTPD co-ordinators and 30 teachers attended). One respondent described NavCon as a "*wonderful thing*". A mini conference was held in September 2002 at Paihia with guest speakers and a range of workshops (attended by seven curriculum leaders, seven principals, five ICTPD co-ordinators and 65 teachers).

Principals and ICT co-ordinators tried various strategies to get staff involved and using ICT. These included: incorporating it into the appraisal system; mandating use through email administrative communication or placing staff handbooks on the web or requiring electronic production of student reports; rewriting curriculum schemes to include ICT or providing release time to learn. Broadwood, in common with other schools, encouraged staff use of technology in order to increase confidence through "mandated" practices like the computerised presentation of planning and reporting. Largely through use for administrative purposes, Northland College reported by mid 2002 having created an accepting "email culture".

In 2003, there is evidence of more schools making system level decisions to support ICT development of teachers, like the three schools who rearranged the school day to provide a compulsory after school session regularly. In two of these the Maori co-ordinator and the FarNet co-ordinator facilitated workshops weekly, while the Maori co-ordinator held further training sessions and hui with regard to developing resources, classroom materials and assessments. Another school had a three day ICTPD retreat. Schools had also begun to self-identify gaps in their teachers' knowledge and skills and, in some schools, ICTPD was more aimed at subject departments and tailored to individual teachers' needs.

Some of this activity was centred round the new provision of laptops for teachers project. The Laptops for Teachers programme (in 2003) was seen by one principal as "*lifting us to another level*" in terms of training. Teachers were reported "*sitting in groups talking about how you do something….peering at a laptop while someone is doing it*". The principal and ICT co-ordinator in this school both felt that people's ICT skills had reached a point where they were "*self-sustaining to a certain extent*". In yet another school, by mid 2003 the principal felt there was someone in most departments who was basically independent and it would be that person working to help others. The ICTPD Cluster Report of April 2003 comments that all schools report having identified individuals who are able to act as mentors for other staff. Individual schools had developed ICT induction programmes for new staff.

In 2003 there was an indication of a shift from a skills based focus to one of ICT integration. In the Milestone Reports mention is made of workshops on the topic of integrating ICT across the curriculum. Activities include the provision of professional development for over 60 staff from throughout the cluster who attended workshops on using and creating webquests. A similar number went to workshops on accessing online resources. By mid 2003, there had also been a video conference training workshop and the FarNet manager hosted a nationwide discussion of Talk2Learn with three FarNet teachers participating; the discussion focused on the realities of online learning for students and for teacher professional development. There was some across-school sharing of expertise. An example of this is where the SmartTools administrators from three schools held a combined sessions to assist all SmartTools administrators. Another is where one school provided subject mentors for another.

PREFERRED COMPOSITION OF GROUPS FOR ICTPD

It is clear that teachers preferred working with those in their own school. One question asked of participants in the ICTPD final survey (September 2003) was in relation to the types of grouping they found most effective when learning ICT skills. The types of groups considered were related to:

5. the level of ICT skill or experience of the members of the group
6. whether members of the group were all from the participant's school or not
7. whether members of the group were all from the participant's department/syndicate or not
8. whether there were separate primary and secondary groups or not.

In each instance they could indicate if they had no preference either way.

Table 2.5 Percentage of participants who preferred various types of groups

Type of grouping	%
Staff from my own school	56
Separate primary or secondary groups	51
No preference about departments or syndicates	48
Same or similar skill level or experience	42
No preference about school type	42
No preference about school	38
Members of my own department or syndicate	36
A mixture of skill levels or experience	30
No preference about skill levels or experience	26
Members of other departments or syndicates	17
Mixed primary-secondary groups	7
Staff from other schools	6

The type of grouping for which there was the strongest preference, overall, was that all members of the group should be from their own school (56%). While not directly comparable, national data from the 2001 and 2002 cohorts of clusters show that 80% of teachers surveyed had either a preference or a strong preference for working with teachers from their own school (Ham & Graham, 2004). This suggests that, if anything, the FarNet teachers were, on average, more favourably disposed towards working with teachers from other schools than were teachers nationally.

While this asking about preference for working with teachers from other schools for professional development only serves as a proxy measure of willingness to collaborate in an online learning community, the fact that 56% preferred to work with teachers from their own school must have implications for the successful implementation of the FarNet community. In fact, only 6% of all FarNet participants said they found working with teachers from other schools to be effective. One possible explanation for this is a belief that their needs were a function of the context in which they worked. Therefore, they wanted professional development to relate to what they needed to know with their students, in their classroom. For one respondent the sharing of resources had little value in that she perceived her resources as being specific to her class and the resources of others as requiring modification to fit her context. Another explanation for viewing working with those from their own school as more effective is the perceived remoteness of many of these schools not only from the rest of New Zealand but also from each other.

The type of grouping respondents were least concerned about was whether a group was comprised of members of their department or syndicate. Nearly half (47.7%) of all responses indicated no

preference with regard to this item. It would appear that they believe that professional development can be designed to cater for the needs of all staff within a school but not across schools. The implication is that there is not a sense of common need or collective responsibility in the Far North and that most of these respondents, at best, felt a sense of belonging at a school level, not at a geographical area level. (In Section 3 we discuss the case of the Maori teaching community that appears to be an exception.)

EFFECTIVENESS OF DIFFERENT TYPES OF PROFESSIONAL DEVELOPMENT

The findings with respect to the perceived effectiveness of different types of professional development reinforce the findings with respect to groupings. In the final ICTPD survey, participants were asked to rate how effective they had found the types of professional development they had undertaken. They were given a list of 14 different potential types and asked to indicate the level of effectiveness on a 5 point scale (0 = not applicable, 1 = not effective, 2 = partly effective, 3 = largely effective, 4 = very effective). For purposes of analysis all non-applicable responses were treated as missing data. Table 2.6 displays the descriptive statistics for each type of professional development.

Table 2.6 Respondents' perceptions of the level of effectiveness for types of professional development

Types of PD	Mn	sd
Release time	3.00	.943
Technology mentors	2.98	.924
ICT conferences	2.88	.993
Practical workshops/seminars	2.85	.864
Retreats or intensive practicums	2.81	1.125
Tutorials	2.78	.780
Study groups	2.68	.914
On-the-spot support/Classroom visits	2.68	.908
Technology coaches	2.63	.913
Lead teachers	2.60	.873
School visits	2.52	.943
Workplace visits	2.46	.934
Professional reading	2.16	.866
List serve membership/e-communities	2.04	.932

The most effective type of professional development was perceived by respondents to be release time (two or more separate days of release over a period of time to attend workshops, seminars or work with a mentor/facilitator). (Note: all definitions are taken from the ICTPD questionnaire.) This finding is in line with the national results where this was also the most favoured option (Ham & Graham, 2004). This would seem to support the earlier contention that these teachers perceive professional development as something that occurs on a formal basis at a designated time.

This was closely followed by technology mentors (highly skilled teachers are paired for a while with less skilled teachers to pass on their expertise). Interestingly, technology coaches (where responsibility for helping others is shared broadly so that each teacher has an area of expertise and everyone is an expert in something – all teachers are therefore able and prepared to help on a casual basis) and lead teachers (teachers with expertise or interest are provided with professional development and then expected to provide ongoing mentoring and workshops etc for other staff) both scored lower than technology mentors. This suggests that teachers prefer to work with someone who is highly skilled on a one to one basis for a specific outcome. This view is supported

by interview data with teachers stating that they asked different colleagues for "just-in-time" help, depending on what they required. It also appears to reinforce the idea that teachers emphasise skills as a priority for professional development.

The least effective methods were seen as listserv membership/e-communities (Mn = 2.04) and professional reading (Mn = 2.16). Listserv membership, in particular, is of concern as one of the key aims of FarNet was the development of online discussion groups and the sharing of resources across an electronic community. It would appear that these respondents are either not ready for this form of discussion or they do not perceive any benefits from involvement. This may be due to a lack of involvement in one of the well functioning listservs for teachers that are currently available on the Internet. The FarNet curriculum group listservs did not function as any more than a one-way information conduit (see Section 3).

Table 2.7 shows the number of participants who either did not respond for a particular type of professional development or indicated with a 0 that it was not applicable to them. Either of these responses suggests they did not undertake that type of professional development.

Table 2.7 Number of participants not taking part in different types of professional development

Types of PD	No. of responses as missing or 0	% of total responses
Workplace visits	143	72
Retreats or intensive practicums	142	71
School visits	135	68
Release time	126	63
On-the-spot support/Classroom visits	125	63
ICT conferences	116	58
List serve membership/e-communities	114	57
Professional reading	113	57
Technology coaches	101	51
Lead teachers	98	49
Study groups	97	49
Technology mentors	95	48
Practical workshops/seminars	81	41
Tutorials	78	39

These data suggest that most participants took part in tutorials (short bursts of on-site learning perhaps before or after school) and practical workshops/seminars (a programme of these scheduled outside school/teaching hours). Interestingly, few participants appear to have visited other schools, an activity which may have strengthened the FarNet community ideal. It is also worth noting that while teachers perceived release time as the most effective form of professional development, in reality few received professional development in that format. The type of professional development most commonly undertaken therefore appears to remain the more traditional style of skills based workshops together with one to one, just-in-time tutorials. While this may have addressed most teachers' initial goals, as already emphasised, such workshops are less likely to effect change in pedagogical practice or to provide for the development of those teachers beyond a basic skills level. Indeed, one respondent interviewed stated that he had spent most of the professional development time helping others and had not learned anything new himself. Interestingly, there was also a suggestion that the professional development failed to meet the needs of those "*behind the 8 ball*". It would appear, therefore, that the professional development as offered may have failed to meet the needs of those at the extremes.

IMPACT ON SKILL

Participants were asked to indicate their level of skill both before involvement in the ICTPD programme and at the time of completing the final ICTPD survey, using a number of categories. Table 2.8 shows the mean level of skill across all respondents both before and after. The scales used were either 4 or 5 point as indicated in brackets after the description of each category. For all categories paired samples T-tests showed significant differences between the before and after skill levels. This increase in skills was also mentioned by interviewees, many of whom commented on how far teachers in the FarNet schools had come. As one respondent stated, "*five years ago there was a feeling that World War III would start if you pushed a button [on the computer]*".

Table 2.8 Comparison of mean levels of respondents' reported skill level

	Mn		
	Before	**After**	**Difference**
Basic computer operation (5)	2.91	3.61	0.70
Internet use (5)	2.92	3.54	0.62
Telecommunications use – email (4)	3.10	3.60	0.50
File management (4)	3.13	3.62	0.49
Spreadsheet use (4)	2.17	2.62	0.45
Graphics use (5)	2.98	3.40	0.42
Word processing (4)	3.17	3.57	0.40
Presentation skills – multimedia (4)	2.09	2.42	0.33
Database use (4)	1.79	2.01	0.22

As already discussed, the acquisition of skills through professional development over the period evaluated could be due to one initiative or a combination of initiatives. It is also important to note that several teachers interviewed emphasised the role the improved access to hardware through FarNet played in skill development. This would have been amplified with the introduction of the laptop programme.

Two areas of skill development are of particular relevance to the FarNet project with its focus on an electronic learning community involving resource sharing and electronic communication. These are use of the Internet and telecommunications use. Apart from basic computer operation, arguably a prerequisite for any computer use, these two areas showed the greatest improvement.

Before the ICTPD programme 13% of respondents did not use the World Wide Web. This decreased to 3% afterwards. There was also a decrease from 29% to 17% in the number of participants at the second level (I can access Internet websites to find information. I follow links from these sites to various other resources). The level at which there was the greatest increase was level 5 (I can create web pages using HTML or an editing program such as FrontPage). The change for this level was from 11% to 22%. While before the ICTPD programme 64% of all respondents were at level 3 or below, this number had decreased to 46% afterwards. There were also decreases in the number of participants in each of the lower three skill levels in telecommunications. Email was rarely used by 13% before the PD but this decreased to 3%. After the ICTPD programme 69% of all participants reported themselves as confident in using email while only 47% had said so before.

As already mentioned, the area showing the greatest improvement was basic computer operation. Before the ICTPD programme 29% of all respondents rated themselves at the first and lowest level of skill, unable to do more than use the computer to run one or two programs that are available. This number dropped to 7% in the post survey. This suggests that nearly a quarter of all

respondents had either not used computers before or had very little knowledge of their operation. There was also significant change in the number of participants moving to level 4 (I download files from the Internet, unzip compressed program files, update hardware drivers, change the file types of files etc). Such skills would enhance their ability to use the FarNet site. Before the ICTPD 23% reported they were able to perform these tasks. This increased to 36% afterwards. Interestingly, 7% of all respondents stated they did not save or open any documents on the computer before the ICTPD programme. This dropped significantly to less than 1% afterwards. This category showed a marked increase in the number of participants at the highest skill level (I move files between folders and drives, follow directory paths, understand the use of folders, use the find feature to locate files on hard drive etc) with 51% before and 71% afterwards.

With regard to using basic software, before the ICTPD programme 7% of participants stated that they did not use a word processing program. This number decreased to 1% after the programme. There was also a marked increase in the number of participants who felt confident about using word processors in all their professional work, including the use of editing and formatting tools (the highest skill level) with an increase from 48% of respondents to 66%. The results for using spreadsheets also showed a decrease in the number of participants who had never used spreadsheets (33% to 13%). The level showing the most increase in participants was level 3 (I use spreadsheets for a variety of record keeping tasks. I use labels, formulas, cell references and formatting tools in spreadsheets. I can make a variety of charts and graphs) with an increase from 16% to 34%.

More than half of all respondents (53%) had never used databases before the ICTPD programme started. While this number did decrease to 36% afterwards, most participants only moved to the next level of skill (I understand the uses of a database. I can locate information from a pre-made database such as a library catalogue or school journal database). The increase at this level was from 25% to 38%. There was little change in numbers for the next two categories with both increasing only slightly. That this category was the one in which the least improvement was shown can be explained in terms of need and relevance to the work teachers undertake. It is likely they use databases that are already set up for school administration purposes so few would have to create their own as described in the highest two levels.

Change in the use of graphics was interesting, with decreases in all of the three lowest levels. Where 22% of respondents had never used graphics in their word processing or presentations only 11% responded in this way afterwards. The increase at level 4 (I capture and edit images from a wide variety of sources, e.g. scanner, digital camera, Internet) was the greatest with the percentage of participants reporting themselves at this skill level rising from 21% to 34%.

The final category was presentation skills/multimedia. There was little change in mean levels for this category, again perhaps reflecting lack of need and also perhaps the fact that additional software and skills are needed for this category. Half of all respondents did not use a computer presentation program before the ICTPD programme. This dropped to 29% afterwards. However, over half of all respondents (59%) either did not use a computer presentation program or were only at the first level of use (I am able to create a simple linear slide show in at least one presentation application) even after the ICTPD. Numbers at the top two levels (incorporating text, graphics and various multimedia elements in linear presentations or creating branching presentations incorporating interactive elements) did not change with 18% of all respondents at these levels before and after.

These results support the reported focus in school Milestone and ICTPD Cluster Reports. Both suggest a focus on the basic operation and use of computers in the ICTPD offered across the

schools. In most areas the greatest reported improvement was within the middle levels rather than a movement to the highest skill level category. Skills at higher levels may be more than most teachers need to use computers in their daily professional lives. The exceptions are word processing, Internet and email, which are areas in which most participants may already have been skilled and therefore professional development could focus on more advanced skills. They are also areas often covered first in ICTPD as teachers have a greater need for skill in these areas due to their generic nature than in others.

IMPACT ON CONFIDENCE

Confidence in using technology is a "significant determinant of teachers levels of engagement in ICT" (Jones, 2004). The Becta report on barriers to the uptake of ICT suggests that confidence is affected by the amount of personal access, technical support and the quality of training available. FarNet was designed to address each of these factors.

In the final ICTPD survey, participants were asked to indicate their level of confidence in using computers personally and with their classes both before and after the ICTPD programme on a 5 point scale (1 = very confident, 2 = confident, 3 = neutral, 4 = not confident, 5 = anxious). (Note: There was no comparable question in the baseline survey.) Table 2.9 displays the mean confidence of FarNet participants. It shows that there was significant improvement in the level of reported confidence in the use of ICT both in personal use ($t = 9.623$, $df = 166$, $p < .001$) and in use in the classroom ($t = 10.150$, $df = 160$, $p < .001$).

Table 2.9 Mean levels of participant confidence in the use of ICT

	Mn	
	Before	**After**
Personal use	2.64	1.90
Use in classroom	2.98	2.21

This reported increase in confidence of participants would suggest that FarNet, broadly defined, was successful in doing so. (We have no national data to date to establish the magnitude of this increase relative to a national average.) A number of participants in the FarNet project were asked what this increase in confidence meant in practical terms. Their responses suggest the increased confidence was primarily due to an increase in skill level and access. However, there is also a suggestion that confidence encompasses their ability to manage the process of using technology.

EFFECT OF PROFESSIONAL DEVELOPMENT ON TEACHING GENERALLY

As one respondent noted FarNet would not necessarily get the credit for any impact on teaching in that most teachers "*would not know what has happened or where it has come from*" but "*FarNet has had a significant impact on what is happening*". For this respondent the areas of impact were both teacher productivity and student learning.

The ICTPD survey asked participants to describe the effects of their involvement in the ICTPD programme on their teaching in a number of ways. In terms of planning 34% of participants reported that they now did "more" planning, while 44% reported "no more". Only 9% reported that they now did "much more". Results were very similar in terms of the time spent evaluating their teaching with 35% reporting "more" time and 50% reporting "no more". Again only 9% reported they now did "much more". Just over half of all respondents (52%) reported that their enthusiasm for teaching had not changed as a result of the ICTPD programme, while 47% reported that it had

increased. Involvement in the ICTPD programme was perceived by 55% of respondents as having helped them to teach more effectively, while 33% felt there had been no change. These results suggest at best a moderately positive impact on participants' teaching as a result of the ICTPD programme, although many perceived there to have been no real effect. This is likely to be a reflection of the range of factors impacting on teaching and learning practices.

Finally, they were asked in what other ways, if any, their involvement had had an effect on their teaching. The results above suggest, however, that the level of effect will have been modest. Responses to this section were coded deductively into thematic categories (Table 2.10).

Table 2.10 Other effects from involvement in the ICTPD programme

Effects	No. of responses	% of total number of responses
Other	12	16
Awareness	9	12
Efficiency	9	12
Confidence	8	10
Changed practice	6	8
More choice	6	8
Motivation	4	5
No change	4	5
Competence	3	4
Ideas	3	4
Changed thinking	2	3
Communication	2	3
Enthusiasm	2	3
Frustrated	2	3
Student learning	2	3
Classroom environment	1	1
Expectations	1	1
Quality of practice	1	1

The most frequent number of responses fell into the "other" category. The majority of responses in this category were explanations as to why the programme had not had more impact for them personally or in their view. Examples of these comments include:

- *I know there is lots of potential but we do not have systems in place to make it work*
- *...try to think of ways to use but don't often have time to work on it*
- *...access is still the major factor influencing use of ICT in classroom.*

A more positive comment was:

- *...looking to improve quality of teaching by whatever means available including ICT.*

The most frequently cited additional effects were raising participants' awareness of what ICT could offer and an improvement in task efficiency. Comments within these two categories included:

- *...reduced workload, enhanced teaching and student learning*
- *...my planning/resources are much tidier*
- *...helped me to use time saving strategies. Learn new techniques.*
- *...think about integrating ICT more into programmes*

- *It's made me aware of what is available; however, maths classes are not timetabled to use computers.*
- *There are other/new methods to use to teach.*

These two categories were followed closely by an increase in confidence. As one respondent stated s/he was now "*more able to contribute to discussion. Less feeling of inadequacy – being left behind*." Changing practice accounted for 8% of all comments as did more choice. Examples of these two categories are:

- *using different learning styles which do not rely on mainly reading and writing*
- *affirmed and given impetus to setting up student centred learning process rather than teacher centred learning*
- *broadened options/views*
- *more activities, resources, use of local resources.*

The six categories discussed above accounted for two-thirds of all responses to this question of other ways that involvement had impacted on teaching. The remaining responses were coded into a further 12 categories, for many of which there were only one or two responses. Among these were responses related to increasing participant motivation for using ICT, increasing their skill level or competence and greater access to teaching ideas and resources. Only four participants responded that it had had no effect while two stated that it had increased their frustrations about the use of ICT.

SUMMARY

Five key points emerge from these data:

1. There was evidence that definitions of what constituted professional development were not necessarily shared so definitive statements about length of support are difficult. The fact that only one-quarter of respondents to the ICTPD questionnaire reported more than two years' professional development support may have limited, at least to some extent, the attainment of higher levels of skill and integration.
2. While the goals that respondents reported for the ICTPD programme were largely met they were limited and did not change over the course of the professional development. These goals were not aligned with those of FarNet, except in so far as a basic level of skill may be a prerequisite to further use, remaining primarily skills and application based and unlikely to impact on pedagogical practices to a great extent. Given the apparent low entry skill level of many respondents it may be unrealistic to expect the goals of FarNet, in terms of pedagogical change and community, to be met in the period of evaluation.
3. There was a significant improvement in the level of reported skill and confidence in the use of ICT both for personal use and use in the classroom over the course of the ICTPD contract/FarNet. Any changes in reported skill and confidence in using ICT have to be viewed as a function of the layering of several projects that encompassed ICT, namely the ICTPD project, FarNet and Laptops for Teachers. The greatest improvements were in basic computer operation and in the use of the Internet and telecommunications.

4. The data suggests that there was, at best, a moderately positive impact on respondents' teaching practices. This may be due to a lack of pedagogical content in the ICTPD generally and the fact that much of the professional development appears to have focused on basic skills in "one size fits all workshops".
5. Of significant concern, given the focus of FarNet on the development of a professional learning community, is the lack of preference for listservs and e-communities as methods of professional learning.

Section 3: The FarNet Community

This section considers what was intended to be the hub of FarNet, namely, the website and also the associated interaction and sharing among the learning community of teachers and, to a lesser extent, students. There are three parts to the section: the development of the website, an exploration of the patterns of use and then a discussion of the extent to which the aim of establishing a professional learning community was realised. Each sub-section concludes with a summary of the key points from that sub-section.

DEVELOPMENT OF THE FARNET WEBSITE

This part considers the development of the FarNet website. The FarNet site is composed of a number of areas. Those accessed from the main page are the Resource Room, the Staff Room, the Student Centre and the Info Centre. Of these, the Resource Room is the most highly developed. There are also links to two areas called About FarNet and Celebrate Whakenui and to the websites of each of the individual schools.

FarNet is a site hosted on the TKI website. Learning Centre Trust was an active partner in this project, instrumental at least initially in assisting with the production and posting of materials and, later, in scaffolding the community towards independence in this respect through appropriate training in the use of software for posting.

The curriculum leader strategy that was integral to the development of resources on the site is introduced first. Then, data are presented concerning the number of resources posted over time and the nature of these resources.

Curriculum Leaders

The notion of curriculum leaders was to encourage the development of appropriate ICT learning resources. They were to co-ordinate both the development and the placing of resources on the site. They were not only to post documents, but also to "provide feedback, debate and direction on the resources posted online in their resource room area" (ICTPD Cluster Milestone 6 Report, June 2002, p. 5).

Curriculum leaders were, therefore, appointed to each main curriculum learning area and a number of specialist areas such as guidance. The role was advertised both through *Korero* and flyers. However, a great deal of "shoulder tapping" was required to fill the positions. Our interviews explored why likely candidates may have been unwilling to step forward. The main constraint appears to have been a belief that their core priority was to their class and their school and such a role would distract from this. As one respondent stated: "*my students want me*" and "*I am working my guts out here [in his own school]*". There was also a notion of self-interest expressed in that "*there is nothing in it for me ....it is a one way track*".

The number of curriculum leaders per area varied and changed over time as the demands of the job became clearer. Some areas like science were split into specialist areas: biology, chemistry, physics and general science from the outset. Other areas such as mathematics initially had one curriculum leader but later split into junior and senior mathematics. The Maori community had three leaders from the outset, covering three distinct geographical areas. At any one time there were between 22 and 28 curriculum leaders. There were also considerable changes in personnel in some areas.

Initially, issues of quality assurance (that the operators of TKI rightly apply to materials posted on their site) appeared likely to stymie efforts to post locally developed materials. Developing the capacity to create, obtain and post resources and, to some extent, to ensure the appropriateness as curriculum materials was the aim of the curriculum leader strategy. Ongoing support for posting was available from TKI. The aim was "to have established, self-sustaining communities, with a website presence that is relevant to their needs through supporting their approaches to learning through ICT and by providing a reservoir of online resources for teachers, and for students" (ICTPD Cluster Milestone Report 6, June 2002, p. 4).

The curriculum leader strategy began in terms 1 and 2 of 2002 and meetings of the various groups, together with Team Solutions Facilitators, were facilitated in March, April and May (see ICTPD Cluster Milestone 6, June 2002). Ten further meetings of various curriculum teams (PE, Music, Drama, Maori, Technology/Science and English) were facilitated between June and September 2002. The FarNet co-ordinator worked to include other groups, addressing the RTLB group members who were subsequently invited to join. Not all curriculum leaders chose to hold face to face meetings, instead using email and phone while employing other forums like NCEA meetings to introduce themselves.

Curriculum leaders were provided with ICT training related to their role, for example, sessions on Manila in term 2, 2002. Some reported face to face sessions with the FarNet co-ordinator on how to log in and "*a quick show as to where I post things and that sort of stuff*". One reported training from the ICTPD co-ordinator in the school. A number of curriculum leaders attended the NavCon 2K2 Conference in 2002 and 2003 and a conference locally in 2002.

Although there was a "*duty statement*" that described the role, a few curriculum leaders at interview were vague as to what it entailed. Curriculum leaders appeared to have a somewhat narrow view of their role. No one described the role in terms of establishing a self-sustaining professional community. For most, their role was to set an example by producing material, to be a contact person and "*a repository*", to "*source best practice or exemplars of work that other people could emulate*" and to arrange the posting of resources. Some extended the last task to developing the site or page. One curriculum leader thought the job involved "*getting people to put resources up*", while others were uncomfortable with the notion of "*getting people on board*" feeling that it "*was not their job*". A Maori curriculum leader said that she did not have to look for people, as "*they will just get in touch with me*".

Resource Room and Curriculum Pages

The home page for the Resource Room contains links to the seven main curriculum areas: Health and Physical Education, The Arts, Social Sciences, Technology, Sciences, Mathematics and Languages. There are also links to other specialist areas (Librarians and Information Centre, Gifted and Talented/Special Needs, Te Kupenga, ICTPD Coordinators, Tutaki Taki, Literacy Leadership and Careers and Guidance).

Details regarding the development of the site were gained through analysis of the curriculum pages at six points in time from July 2002 through to July 2003. The initial viewing of the site by the evaluators was in May 2002 when the site was first developed and only a basic framework, or structure, was present. After the initial visit the site was visited every two months and records kept of the resources and material found. Resources were categorised into 11 main types of category. These were: student work samples, student handouts, student activity worksheets, homework

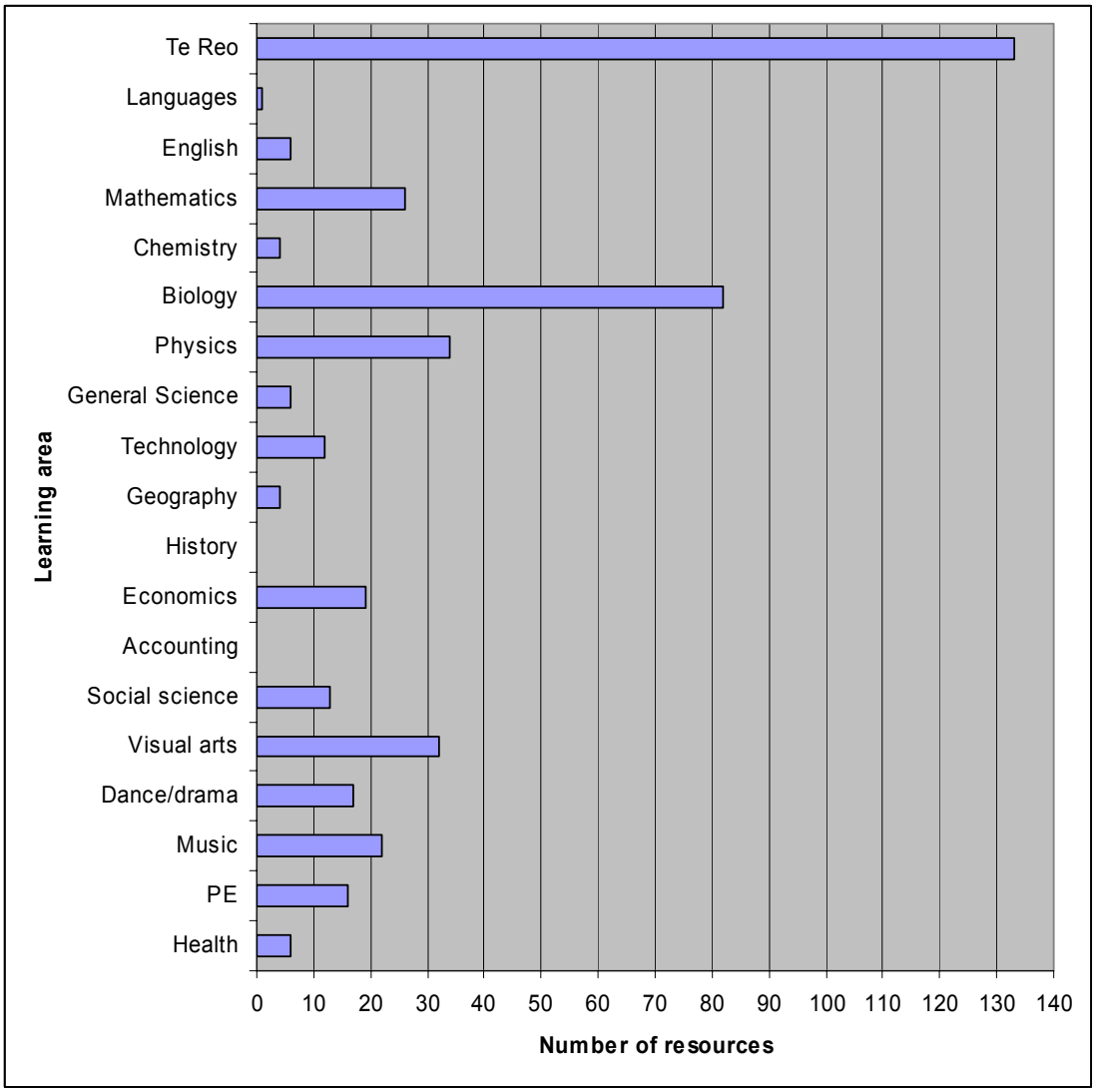
sheets, teacher material (word), teacher material (PowerPoint), exams/tests, webquests (external), webquests (original), external links and NCEA related material.

In the following parts the number and type of resources within the curriculum areas are discussed before a brief consideration of the other areas.

Number of Resources on Curriculum Pages

By July 2003, there were a total of 442 resources of varying kinds on the website. These resources vary markedly in terms of quality and size and, in one sense, it is inappropriate to make direct comparisons based on a count of resources. Figure 3.1 displays the total number of resources within each subject area at July 2003.

Figure 3.1 Total number of resources/links for each subject area in July 2003



The most prolific site in terms of the overall number of resources is the Te Reo area. This has 120 separate documents on it and 13 subject links equating to approximately 30% of the total resources on FarNet. Most of these documents are short and relatively simple in structure but this is not to understate the importance of a large resource bank such as this. In a later part of Section 3, we explore explanations as to why Maori resources outstripped other areas, aside from the obvious advantage of the services of a Maori co-ordinator in 2003. We discuss the ethos of collective

responsibility and the pre-existing community networks on which FarNet could build as likely explanations.

The next largest area is Biology, which has a number of highly visual PowerPoint presentations on it, many of which are specific to the local area in terms of content. This area has a total of 82 resources. Again, later in this section explanations are suggested. These two sites, Maori and Biology, contain far more resources than any other site with the next most developed being Physics (34 resources) and Visual Arts (32 resources). Neither History nor Accounting has any material on them while there is only one link for International Languages.

The site was visited regularly over a 12 month period and Figure 3.2 displays the total number of resources on the site at each visit, while Table 3.1 summarises the number of resources added between visits for each time period. These show that the main periods of activity in terms of adding new resources to the curriculum pages were between September and November 2002 (n = 107) and February and April 2003 (n = 147). Flurries of activity would seem to be related to teacher release days for curriculum resource production or workshops with the FarNet co-ordinator aimed at the production and posting of resources.

Figure 3.2 Total number of resources on FarNet site over time

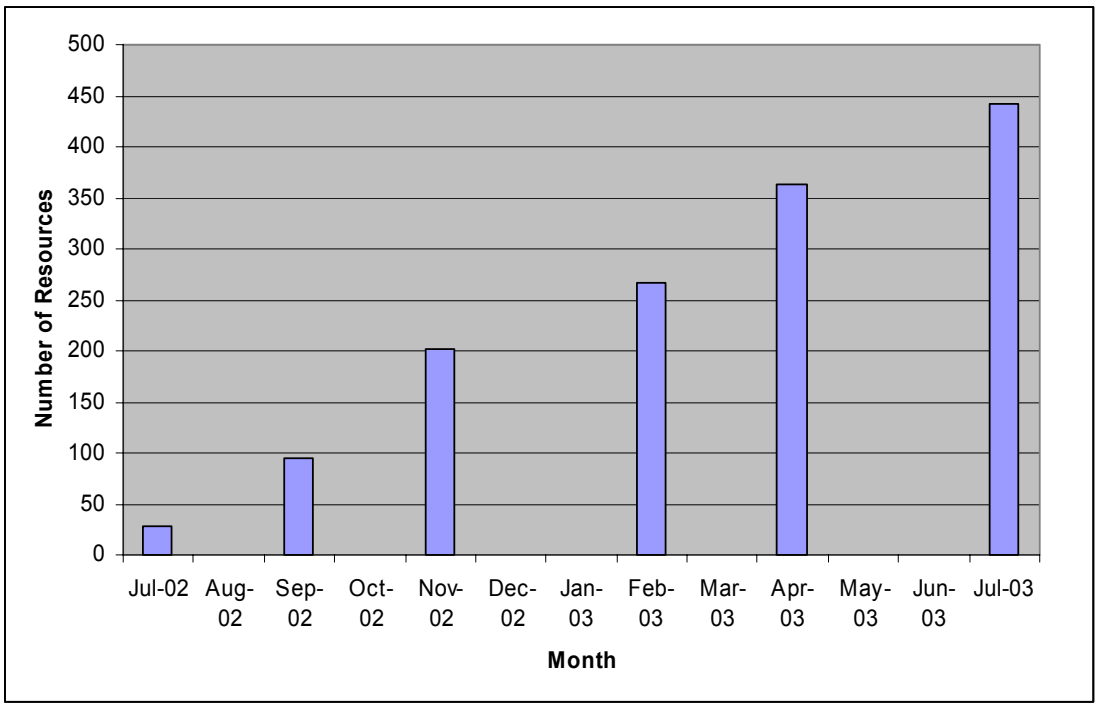


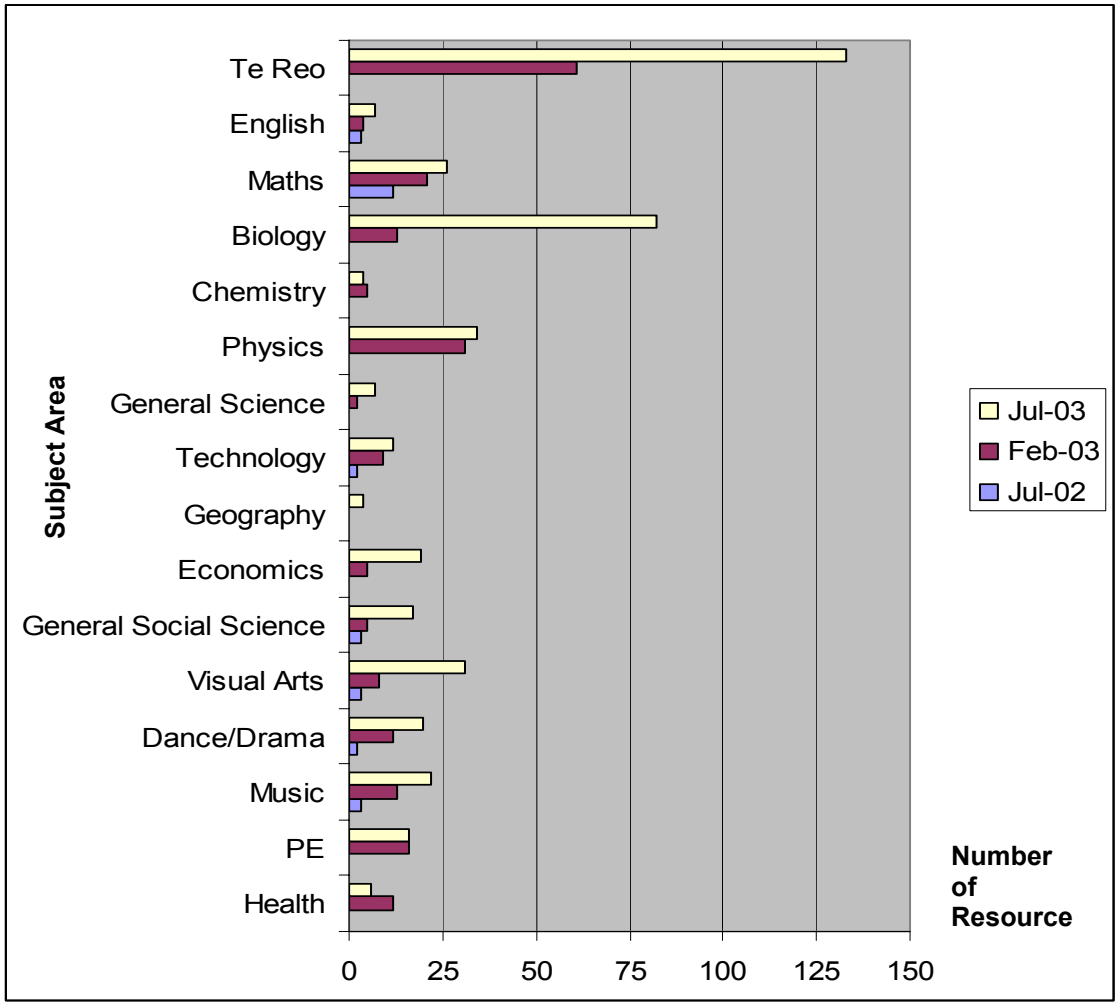
Table 3.1 Number of resources added between visits

Start	Finish	Number added
May 2002	July 2002	28
July 2002	September 2002	67
September 2002	November 2002	107
November 2002	February 2003	15
February 2003	April 2003	147
April 2003	July 2003	78

Figure 3.3 displays the total number of resources within each subject area at three points in time (July 2002, February 2003, July 2003). This shows that, for many subject areas, a lot of work was

done between February and July 2003. It is possible that curriculum leaders have had a "*burst of enthusiasm*" or "*bout of guilt*" as they described it to us and pushed hard to get resources on in two distinct periods before either losing motivation or getting caught up in other concerns as the school year progressed. Interview data with curriculum leaders support both possibilities. It may be also that this marked a critical period in terms of when the ICTPD skills gained "traction". In particular, the two most developed sites, Te Reo and Biology, grew markedly over this time with 72 new resources added for Te Reo and 69 for Biology. The appointment of Te Kaiwhakahaere Maori for 2003 may partly explain the activity on that site. There were also NCEA Resource Days to create materials. Visual Arts, General Science and Economics were three other areas where most of the resources were added in this period. In other areas growth was steadier while yet others showed little development after the initial period of May–June 2002.

Figure 3.3 Total number of resources by subject area over time



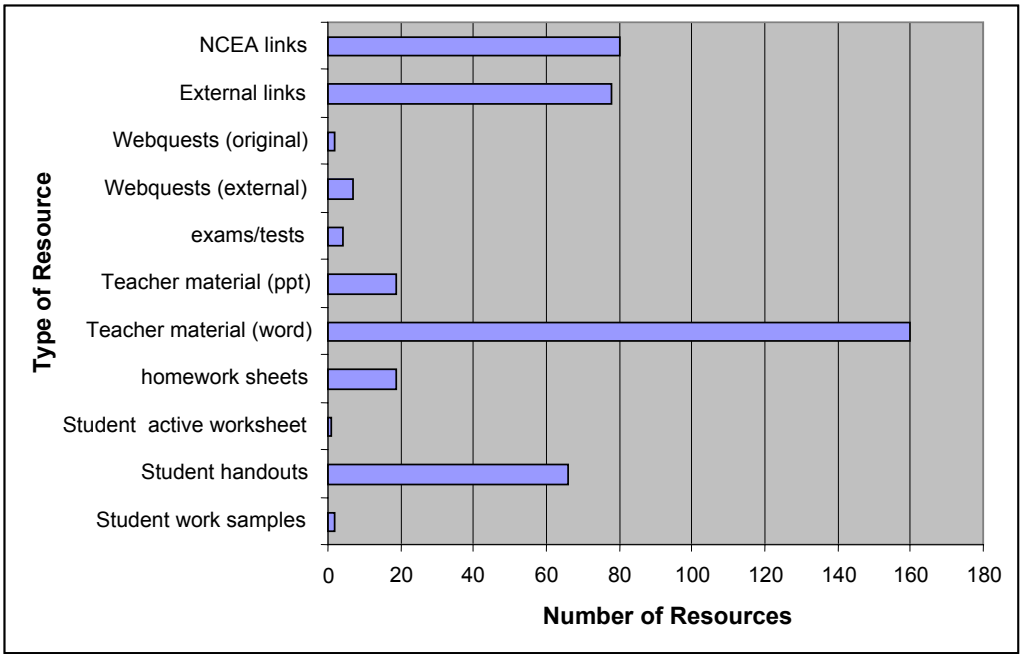
Type of Resources on the Curriculum Pages

Figure 3.4 displays the total number of resources on the site within each category in July 2003. The most common type of resource was Word documents for teachers to use, such as lesson plans, teacher notes or unit plans, these together making up 36% of all resources on the site. The next most common type of resources are external links and links to NCEA sites (18% each). In fact combining these two types (both of which are external links) would mean this type of resource was equal to teacher material in terms of quantity. What this implies is that teachers are using FarNet as a distribution point for lesson material already developed rather than creating new web based or

student centred resources. In many ways the site represents an electronic folder for filing material. Many of the external links are to professional organisations or other resource sites on the Internet.

Very little material has been developed for student use and the material that has been developed is predominantly handouts such as worksheets and quizzes, which were designed to be printed off and handed out to students as paper resources. This suggests that it is highly unlikely that there has been any substantial change to teaching and learning practices in these schools as a result of developing resources for (or, alternatively, using resources from) the FarNet site.

Figure 3.4 Total number of resources by type at July 2003



Contributors to the Curriculum Pages

There was little contribution to the Resource Room pages from anyone other than the curriculum leaders. In fact, only six sites had any material provided from other sources. Table 3.2 displays the number of additional contributors on those sites where material had been provided. In most instances these contributors had provided one piece of material.

Table 3.2 Sites with other contributors

Subject area	Number of additional contributors
Music	2
Visual Arts	3
Economics	14 (working in pairs)
Physics	2
Biology	2
Maths	2

Curriculum leaders were aware of this issue. One reported: "I wouldn't say that the stuff I put up there was wonderful. It was just stuff that I had done… And I had hoped that people would supply that [materials] to me but it just hasn't arrived from anywhere". Another leader explained that

"…you set it all up and then everybody says 'yes, yes' and you show them in PD days and [they say] 'Oh, that's terrific', and they take two things and you never hear any more".

There are a number of explanations as to why few teachers were posting resources. It seems that it was not simply because they had not created any. There is evidence from the interviews with curriculum leaders and ICTPD co-ordinators that teachers were creating resource material and were often sharing with others at their school. At one school, the curriculum leader said there were a lot of people willing to share and that when they created resource materials at school, they always emailed it to everyone in the department. At another school the sentiment of teachers seemed to be that it was safe to share on the school intranet, especially before going wider onto FarNet. That there remained a lack of willingness to share with a wide audience was attributed to teachers wanting to retain ownership of their intellectual property in the light of the uncertainty around whether their act of sharing would be reciprocated. Curriculum leaders and ICTPD co-ordinators also suggested that teachers were reluctant to share and to expose themselves to possible negative feedback because they felt that what had been produced might not be good enough.

Bilingual Resources

The importance of generating material from the local context and from a local bilingual base was acknowledged in the original documents launching FarNet where a strong need was seen for resources in Te Reo Maori and using Tikanga Maori. Data from interviews with Maori principals and teachers show that there was widespread support for the development of an online Maori community and resource centre from within the wider Maori community.

An ERO report relating to Whangaroa in 2002 noted the involvement in the FarNet Digital Opportunities Pilot Programme and the fact that the kaumatua and kuia wanted a part of it to be set aside where local Maori resources, specific to Whangaroa, could be placed. The ICTPD Cluster Report of April 2002 noted that the curriculum leader Maori, along with kaumatua and kuia, and teachers from other FarNet schools met at Whangaroa College on 14 and 21 February to discuss the parallel development of Te Rohe Kupenga o Tokerau (the Maori pages that parallel the English pages on the FarNet site). At that meeting agreement was reached on the content and form of the entry portal describing the whakapapa of Tokerau. Doing so was perceived as important in that it "*validates knowledge… legitimises local knowledge*". There was also acknowledgement of the need to gather korero from each school area. One principal noted that doing so "*enhances and supports the activities of the school through a different medium that is attractive to kids*". It was also noted in this report that several stories are posted online for further development. Certainly, as noted earlier, a large number of Maori language resources have been posted on the FarNet site.

General Comments about the Curriculum Pages

The experience of the evaluator in accessing the Resource Room in order to gather the data described above was that the FarNet site is unwieldy and difficult to move around in. There appears to have been an original standard template created with side bars for navigation. However, few of these bars were used by the curriculum leaders and many of the links to other pages are off the home page itself. Each of the subject areas is broken into year levels and/or content areas, meaning teachers have to work through a number of pages to find resources. Indeed, the curriculum pages appear to have been developed along the lines of a highly structured department scheme with everything compartmentalised. This shows a lack of change in organisational thinking and again this may be less likely to support change in teaching and learning practices through the introduction

of FarNet. While some attempts have been made to personalise pages, this does not always sit comfortably with the standard format and this adds to the confusion and difficulty of navigation.

Other Areas on the FarNet Site

Literacy Leadership

The secondary literacy leadership programme focused on professional leadership of literacy both in secondary schools and teacher professional associations. The aim was to develop a clear understanding of literacy achievement and to develop ways for schools to make positive sustainable changes.

A considerable amount of work was done on this section in November 2002. Prior to this the site had one home page that provided three external links to sites about literacy leadership and the Te Kete Akoranga project (TKA), which is the Far North literacy professional development initiative.

In November four further sections were added. These were Strategies, Professional Development, Essential Skills Assessment and Administration. Four worksheets related to literacy strategies in mathematics were placed on the Strategies page. The Professional Development section provided links to a PowerPoint presentation about TKA and to a webquest page. The Essential Skills Assessments page contained 10 links to NZCER papers. Finally, the Administration page provided information regarding the people involved in TKA. In April 2003 a further section was added where teachers could access a number of administrative forms such as a travel or tax claim form.

Careers and Guidance

No work was done on this site until November 2002 when a Careers page was developed. This page provided 10 links to other websites such as Kiwicareers, Tearaway or the New Zealand Association of Councillors. A Guidance page was also developed but had only a short personal message on it from the co-ordinator.

In February 2003 a link to information related to the Gateway project in the Far North was added to the Careers page. This information was provided by the curriculum leader. No further work was done on this site.

Librarians and Information Resources Room

This site was developed in November 2002. The home page provided links to six sections: Information Literacy, Service, Reading, Access, Information Resources and Place. A short explanation of each was given. Only the Information Resources page had any material on it. Here there were links to three other external sites.

In February 2003 the home page was changed slightly with definitions given for each of the headings and information regarding a Ministry of Education document “The School Library and Learning in the Information Landscape: Guidelines for New Zealand Schools”. There was also a message regarding the School Library Association Annual Conference to be held in the Far North in 2003. Work had also been done within each of the six sections listed above. Guiding principles had been added to all of them, while within Reading some resource material had been added. Similarly new links had been added to the Information Resources page.

Summary

Key points from this sub-section are:

1. The curriculum leaders, on the whole, did not view their role as being to develop a professional learning community. This is probably due to their understandings of the role of a "leader" and how the role might relate to the broader goals of FarNet.
2. The number of resources on individual curriculum pages varies greatly, with Maori and Biology having markedly more than others. These two account for one-third of all resources.
3. Resources are predominantly Word documents for teacher use or links to external sites including NCEA material. Together they account for more than 70% of all resources.
4. There was little contribution from anyone other than the curriculum leaders. Many of the leaders commented on the difficulty of obtaining resources from other teachers and their apparent unwillingness to share material.
5. Success criteria for curriculum leaders included: a wide range of resources posted; communication, regular exchange in the chat room areas; level of "traffic" and a sense that they were "one big department". Whichever of these criteria, singly or in concert, was used, the consensus among curriculum leaders was that it had "*not gone as well as expected*".

USE OF THE WEBSITE

A central goal of the FarNet project was for teachers to create a large number of resources that other teachers could access. The previous section considered the extent, type and timing of resources posted. We now turn to the issue of access or use of those resources. First we examine access over time, generally from statistics generated by the TKI website. However, we were interested in finding out the extent to which teachers in the Far North reported accessing the resources, which ones they accessed and how they may have used them.

Information relating to teacher access and use of the website was gained from a survey that was distributed to all teachers in the FarNet schools in conjunction with the final ICTPD contract survey. The purpose of the additional survey was to question participants about their use of both the FarNet site and the Internet as a whole. A total of 221 surveys were returned (this compares with 199 respondents to the second ICTPD survey).

TKI Data on Use of the FarNet Site over Time

Statistical data on the TKI website regarding the number and length of visits to the FarNet site was analysed in addition to the analysis of number and type of resources posted. While these data regarding the total number of visits are problematic in that the number of hits are exaggerated due to the method of counting used (items within a page are counted rather than the whole page) they are still indicative of trends over the period of time analysed. Table 3.3 displays key information from this data.

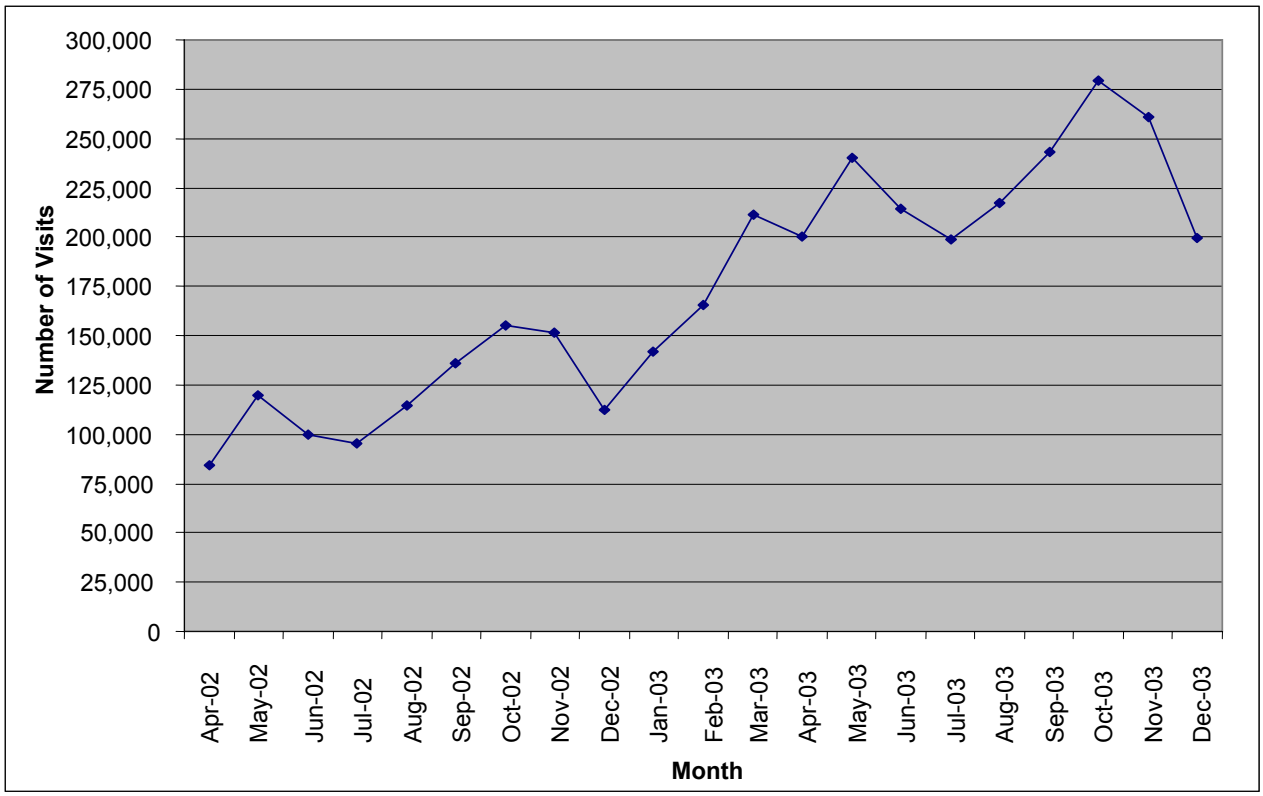
Table 3.3 FarNet site: number, length and type of visit

Month	Total Number of Visits	Median Visit Length	Unique Visitors [1]	Visitors Who Visited Once	Visitors Who Visited More Than Once
Apr-02	83,892	0:03:55	38,335	28,677	9,658
May-02	119,341	0:03:30	49,737	35,228	14,509
Jun-02	99,827	0:03:29	43,247	31,657	11,590
Jul-02	95,629	0:03:50	41,052	30,049	11,003
Aug-02	114,530	0:03:29	47,813	34,394	13,419
Sep-02	136,169	0:03:04	50,177	34,301	15,876
Oct-02	154,974	0:03:11	59,193	43,389	15,804
Nov-02	151,364	0:02:40	59,007	45,594	13,413
Dec-02	112,484	0:02:28	42,996	35,528	7,468
Jan-03	141,682	0:03:01	57,602	46,942	10,660
Feb-03	165,824	0:03:21	66,584	51,656	14,928
Mar-03	211,448	0:03:40	81,099	59,771	21,328
Apr-03	200,163	0:03:41	85,739	65,243	20,496
May-03	240,320	0:03:23	95,592	69,014	26,578
Jun-03	214,186	0:03:19	85,585	62,666	22,919
Jul-03	198,754	0:03:26	81,138	60,307	20,831
Aug-03	217,157	0:03:07	91,298	66,931	24,367
Sep-03	242,914	0:03:00	108,046	83,321	24,725
Oct-03	279,213	0:02:42	122,208	93,945	28,263
Nov-03	260,682	0:02:30	112,920	88,513	24,407
Dec-03	199,247	0:02:26	91,290	75,654	15,636
totals for 2002	**1,068,210**		**431,557**	**318,817**	**112,740**
totals for 2003	**2,571,590**		**1,079,101**	**823,963**	**255,138**
Ave/month 2002	**118690**	**0:03:17**	**47951**	**35424**	**12527**
Ave/month 2003	**214299**	**0:03:08**	**89925**	**68664**	**21262**
% of total 2002			**40**	**30**	**11**
% of total 2003			**42**	**32**	**10**

1. *Unique Visitors* is the number of individual people who visited the site.

There is an overall increase in both the total number of visits to the site over the period from April 2002 to December 2003 and in the average number of visits per month in each year. The increase in overall visits is not steady, however, and there are periods where activity increases markedly followed by troughs in the number of visits (Figure 3.5). These troughs can be explained at least partially by the school calendar and may also relate to periods of time when there was a focus on FarNet and when curriculum leaders were placing more material on the site. Comparing averages between 2002 and 2003, however, does show a marked increase in activity in 2003 compared with 2002.

Figure 3.5 Total number of visits to the website over time



It is important to note, though, that only 11% of visitors in 2002 and 10% in 2003 visited more than once in a month. This suggests that while people were visiting the site they were not regularly using material on it. The relatively short periods of time people have spent on the site, as shown by the median length of visit figures, also suggests relatively little use of the material on the website.

Interestingly, the breakdown into types of visitor (once only, more than once) have remained relatively constant, suggesting little change in patterns of behaviour when visiting. Similarly, there is little change in the median length of visit with 2003 actually slightly down on 2002.

Teacher Reported Use of FarNet Site

These data primarily come from the FarNet questionnaire but additional material was gleaned from interviews with teachers. As explained previously, we distributed a brief questionnaire in term 3, 2003 designed specifically to ask about use of the FarNet site. Of the 221 respondents a total of 180 (81%) stated that they had accessed the FarNet website at some stage during 2003. Those respondents who had not visited the site (n = 41) were asked to explain why they had not. Only 37 respondents provided any reason while some provided more than one for a total of 49 reasons. These reasons were coded into seven categories, which were developed inductively from the responses. Table 3.4 displays the total number of times a reason was coded into each category and the percentage of all reasons given that each category represents.

Table 3.4 Number of reasons for not accessing FarNet within each category

Category	Number of times used	% of all reasons
Time	14	29
Knowledge	11	22
Need	8	16
Technology	7	14
Other	5	10
Motivation	2	4
Usefulness	2	4
Total reasons	**49**	

The most commonly given reason was time. Respondents who offered comments coded in this category were clearly not prioritising use of the FarNet site as they feel there are other, more pressing issues to deal with. For many the comment made was simply "*lack of time*" or "*too busy*". Others were more specific about what other things they were prioritising as can be seen in the following two quotes:

- *It's just a resource that I haven't looked at as I'm slowly coming to grips with teaching Year 9 and 10 maths.*
- *...no time do things that aren't essential and urgent.*

The second largest category to explain non-use included all comments related to the respondents' knowledge. Reasons given in this category included a lack of knowledge about what FarNet is (2), about how to find it (1), how to use it (6), and how it could be helpful to them (2).

Eight participants, who had not accessed the site, stated that they had not needed to. Of these, two explained that they did not need to access it themselves as others printed off anything that might be useful and gave it to them. This category is closely related to motivation, where the two reasons given were "*lack of inclination*" and "*lack of interest*". Only two participants stated that they had tried FarNet and not found it useful.

Some reasons for non-access related to technology. Within this category (n = 7) access to FarNet was an issue for six of the respondents. This was due either to lack of computer access or poor connectivity. One of the respondents claimed to be a "*computerphobe*" and never used technology if it could be avoided.

In the school Milestone Reports there were some indicators of why, even in late 2002, the FarNet site was not used. "*Even though I am involved in the X site, I very rarely go to FarNet itself. At this stage there are very few resources available and unfortunately little need to visit the site.*" Clearly, if teachers looked at the site relatively early in its development, they were likely to have found little and, if not highly motivated, they may have been disinclined to visit again.

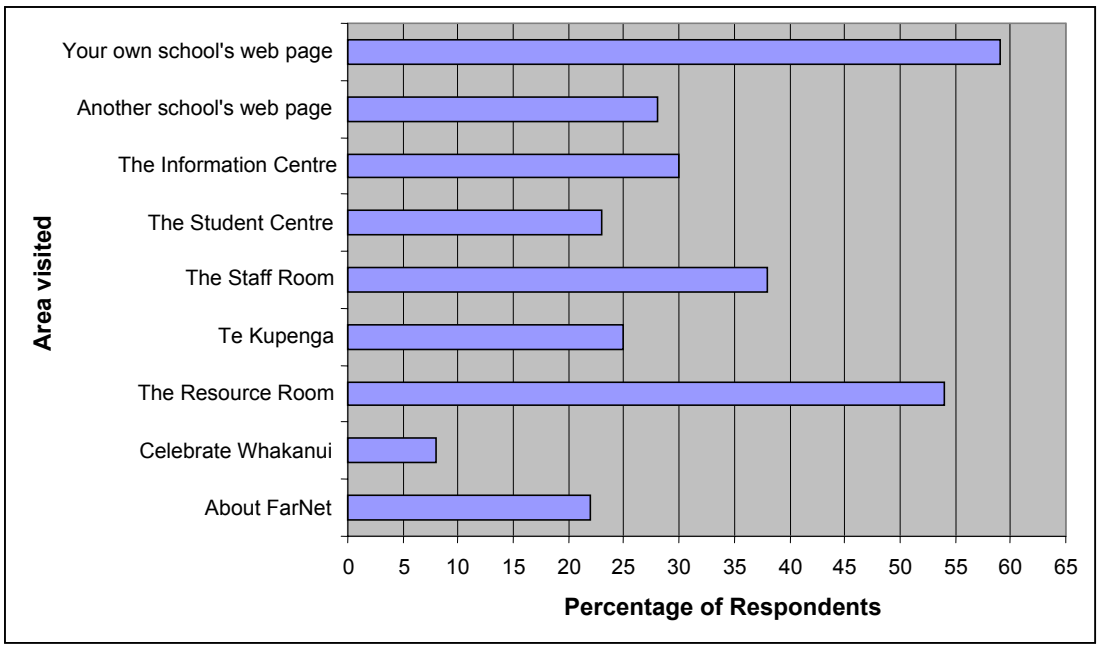
Interviews with teachers suggested other reasons for not accessing the FarNet site. One of these was that it was competing with a number of other established networks, or sites, such as TKI (particularly areas relating to NCEA), English Online and Drama Net. More informal sharing also occurred where teachers knew each other already, making FarNet unnecessary. Another explanation offered was that access to FarNet was an issue in that "*it takes ages to download*" and you need a password to get into it. Being password protected meant that at least one teacher viewed FarNet as being "*behind a closed door [for which he] did not have a key*". Access was also an issue

for teachers who either did not have computers at home or for whom the speed of their Internet connection was problematic.

Visits to Specific Areas within FarNet Site

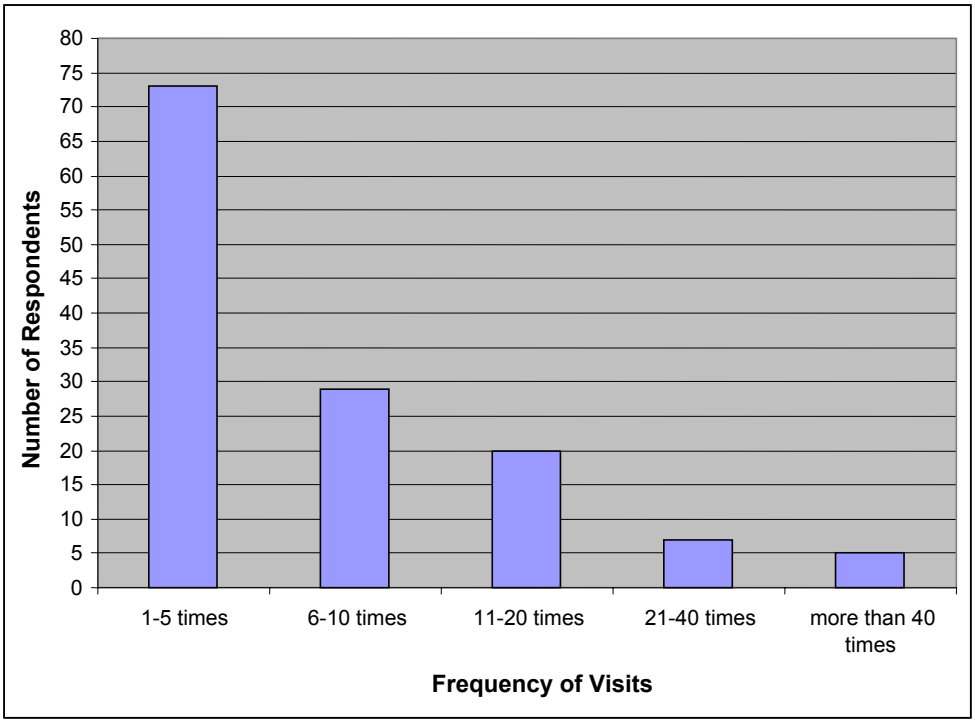
In the FarNet questionnaire those respondents who had visited the FarNet site were asked which areas they had been into. Figure 3.6 is a graphic representation of the percentage of respondents who visited different areas within the website. This shows the most frequently visited site was the respondent's own school site (59%) followed by the Resource Room (54%). These were the only areas that over 50% of participants visited during 2003. Least visited was Celebrate Whakanui (8%).

Figure 3.6 Percentage of respondents who visited specific areas within the FarNet website



Respondents to the questionnaire were also specifically asked how often they had accessed the curriculum pages in the Resource Room during 2003. The majority (54%) of respondents who reported visiting the curriculum pages had visited between one and five times, while 75% had visited between one and 10 times. Four percent reported they had visited the curriculum pages more than 40 times while 6% had visited them between 21 and 40 times. It can perhaps be assumed that these latter groups are curriculum leaders. Figure 3.7 is a graphic representation of the frequencies of reporting for each level of times visited.

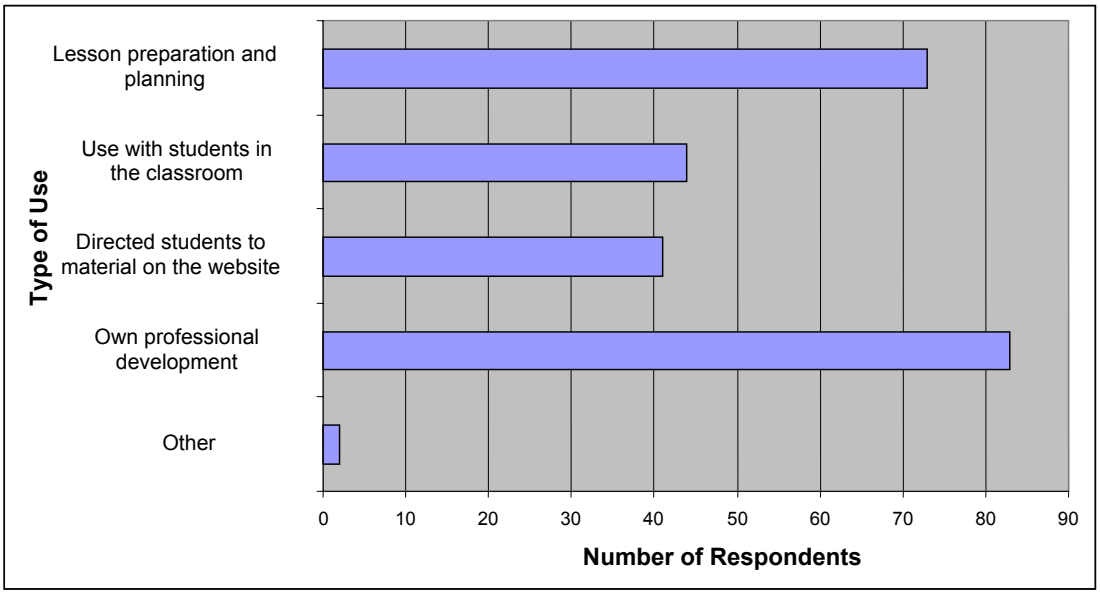
Figure 3.7 Frequencies for number of visits to curriculum pages by respondents



Use of Material from the FarNet Site

A further section of the FarNet questionnaire asked respondents whether they had used material from the website and, if so, how they had used it. The categories they could choose from were: not used any material; lesson preparation and planning (ideas for teaching); for use with students in the classroom (e.g. worksheets); directed students to material on the website; for your own professional development; and other. Of the 180 participants who had visited the website, 64 stated that they had not used any material from it (36%). Of those who did use material, the most common use is for respondent's own professional development (n = 83). This was followed by lesson preparation and planning (n = 73). The dominance of these two categories suggests that FarNet has been used by teachers as a resource for their professional work rather than as something they use directly with students. Indeed, only 44 respondents had used material from FarNet such as worksheets with students in the classroom while 41 had directed students to it. Figure 3.8 is a graphic representation of the number of participants who report using material from the FarNet website in particular ways.

Figure 3.8 Number of respondents using FarNet material in particular ways

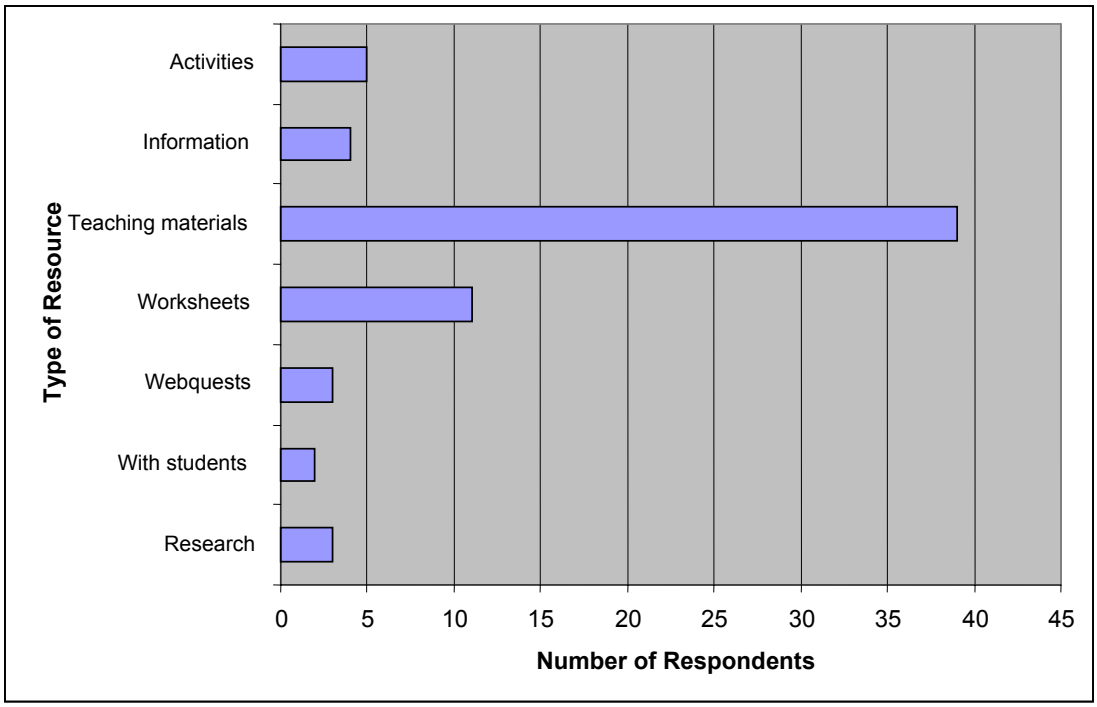


Participants were then asked to describe as specifically as possible what they had used. The descriptions given were coded into three major categories: assessment-related materials, resources and other. Twelve responses were not included in the coding. Of these, five were instances where respondents stated they had not used FarNet. The other seven included comments that were difficult to understand or implied perfunctory use or a lack of use. Where respondents gave more than one example these were treated as individual responses.

The most commonly used category was resources with 67 responses coded into this category. This was 74% of all responses given. Part of the reason for this dominance can perhaps be attributed to the fact that the sample answers given in the question were a "good website for teaching materials" and "a useful worksheet for your Year 10 class". However, it must be remembered that FarNet is currently predominantly a resource bank. Responses within this category were grouped into 17 different sub-categories based firstly on the type of resource used and then, where mentioned, by the subject the resource was used in. Depending on the amount of information provided some responses could be coded into more than one sub-category. For example, "ideas for teaching Biology" was coded into both the "teaching materials" and the "Biology" sub-categories. Only 26 responses specifically mentioned a subject area. This number is, unfortunately, too small to provide valid data about the use of specific subject material, although it is interesting to note that Maori and Maths were most frequently mentioned (n = 6) followed by Biology (n = 4) in that on at least two of these sites there was markedly more material posted than on others.

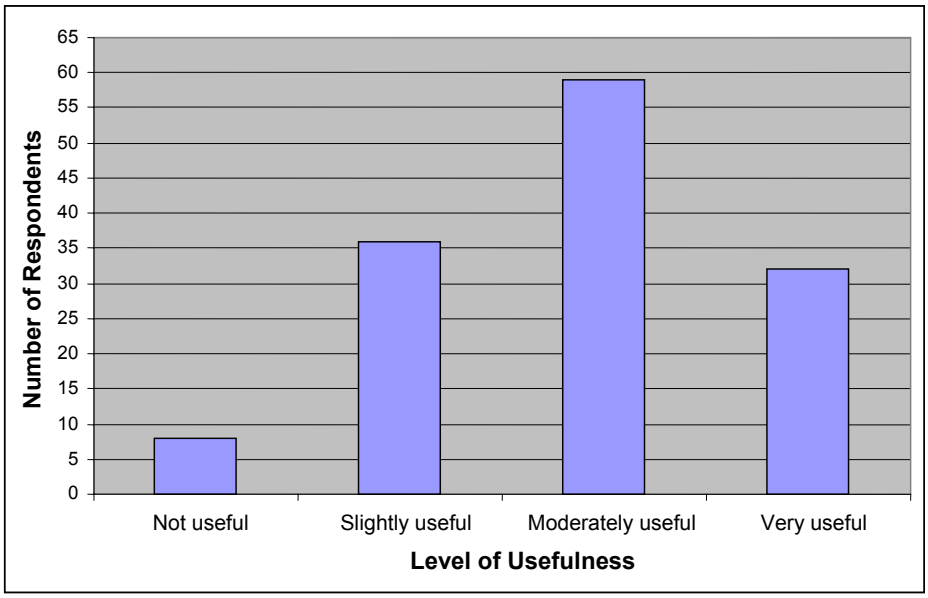
Figure 3.9 displays the number of responses within each type of resource mentioned. The most commonly used was the general "teaching materials" category (n = 39). Examples of responses from within this sub-category include "*good maths teacher references*", "*physics resources and links*", "*stories from Te Kupenga*" and "*some literacy strategies*". The next most common sub-category was worksheets (n = 11). All responses coded into this sub-category mentioned worksheets specifically. The other sub-categories used were activities (e.g. word finds, puzzles); information; research, with students and webquests.

Figure 3.9 Number of responses within each type of resource



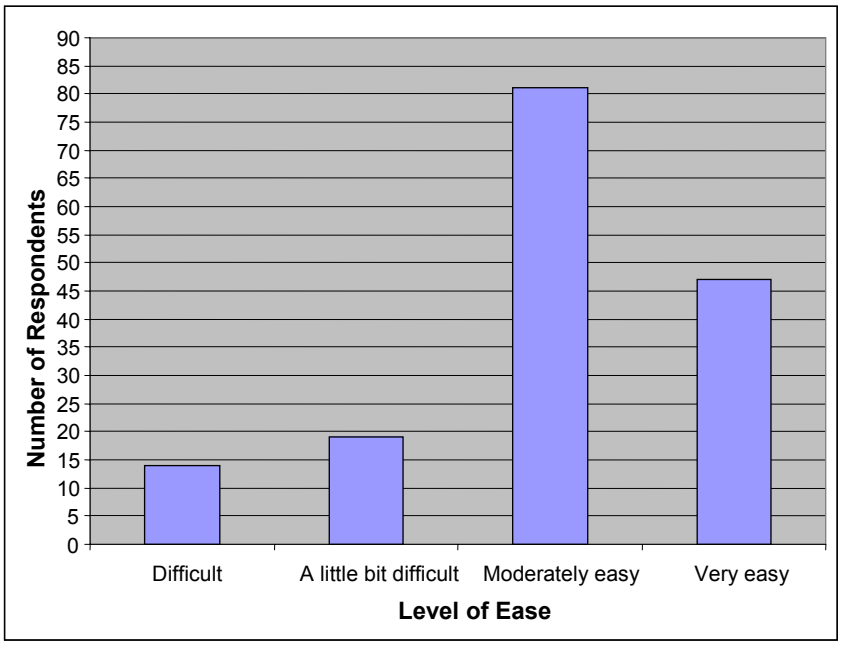
Respondents were asked on a 1–4 scale how useful they had found the material they had used (1 = not useful, 2 = slightly useful, 3 = moderately useful, 4 = very useful). There were a total of 135 responses for this question. The mean response was 2.85 with a standard deviation of .851. This suggests that of those participants who used material on FarNet the majority found it approaching moderately useful. Figure 3.10 displays the frequencies for each level of usefulness.

Figure 3.10 Frequencies for level of usefulness of FarNet material



The next question asked participants to what extent they had found FarNet easy to use. Again a 4 point scale was used (1 = difficult, 2 = a little bit difficult, 3 = moderately easy and 4 = easy). The mean level of ease was 3 or moderately easy. The standard deviation was .873. This appears to be in conflict with the evaluators' own concerns about the unwieldiness of the site as a whole. Figure 3.11 shows the frequency for each level of ease reported by respondents.

Figure 3.11 Frequency for reported level of ease of use of FarNet



Summary

Key points from this sub-section are:

1. The number of visitors to the site increased over time, although the pattern of visits remained the same. Most visitors remained on the site for a short period of time and visited only once.
2. Most teachers (81%) had visited during 2003. Those who had not visited frequently cited time as the main reason.
3. The most frequently visited site was their own school site followed by the resource room.
4. About one-third of those who visited reported that they had not used any material from the site. Of those who did use material the most common use was their own professional development followed by lesson preparation and planning.
5. Most participants who reported using material found it moderately useful.

CREATING A PROFESSIONAL COMMUNITY

A major goal of the project was "to support changes in access and attitudes to learning as well as a culture of collaboration across schools", the latter particularly in terms of "curriculum planning and delivery". In the scoping interviews for the project, a majority of the success indicators offered by the interviewees concerned quality resources, including: the development of bilingual resources; increased sharing (of resources) and increased connectivity, specifically regular communication using the web; use of web resources in teaching; improved teacher capability, specifically in the use of technology; lessening of teacher workload through technology; and improved student outcomes, including attitudes.

As Hargreaves (1994) notes, collaboration and collegiality are widely seen as means of ensuring effective implementation of change introduced from outside. The implication in FarNet was that

successful posting and sharing of resources and email communication by teachers would contribute to ensuring the success of the introduction of Internet technology and ICT use in the schools.

One of the evaluation questions posed was "To what extent do patterns of intra-school and inter-school collaboration, co-operation, and sharing in teaching and learning, including the development and use of curriculum resources utilising ICT, change during the project?" We explore this research question, and the extent to which the desired success indicators were evidenced, from an analysis of the appropriate sections of the FarNet questionnaire and the ICTPD pre and post surveys as well as transcripts of interviews with principals, teachers and curriculum leaders and the Milestone Reports of the ICTPD Cluster and individual schools.

One of the assumptions outlined in Section 1 that underpins this project and is encapsulated in its title "Learning communities in the Far North" is that it is feasible to build a virtual learning community. Once again, much rhetoric surrounds the idea of the possibilities of electronic communication to create and support online communities of educational professionals. The use of computer-mediated communication is seen as a valid form of professional dialogue, support and exchange. Promoting professional online communication is often a major part of the attempt to make the use of information and communications technology (ICT) part of day to day practice in schools. As in the case of the use of ICT to change learning, there may be a similar rhetoric-research gap. The suggestion is that much "hyperbole" surrounds online forums (Selwyn, 2000, p. 751) and there is a need for research to examine more closely the many claims.

The aim of establishing learning communities was linked to another aim of the FarNet project, namely, to bring about a change in teacher pedagogy and to enhance student learning outcomes. We have alluded, in Section 1, to the debate about whether ICT is a successful change agent or, as is more likely, a lever in terms of pedagogical change (Venezky & Davis, 2002) and we do not propose here to review the issue of different pedagogies leading to differential outcomes (see Becker, 2001; Kulik, 1994; Niemiec & Walberg, 1987; Shakeshaft, 1999). Rather, we want, in this part of Section 3, to consider the extent to which the FarNet project supported the creation of a professional learning community focused on enhanced teacher practice and student outcomes. In this we cite the notion of the largely theoretical work concerning the likelihood of change through such communities (Little, 1999). We aim to illustrate from the data regarding FarNet some of the issues and challenges surrounding virtual professional interaction and learning and also to suggest the nature of the interlocking pieces in the development of an effective model for an online community.

The rationale for professional communities of teachers is to provide an ongoing, sustainable vehicle for teacher learning (Cochran-Smith & Lytle, 1999; Darling-Hammond & Sykes, 1999). Professional learning communities have distinctive features that include: shared norms and values; collective learning through collaboration; the application of that learning in a focus on student learning; shared personal practice and reflective dialogue (Kruse, Louis, & Bryk, 1995). A genuine professional learning community does not involve "comfortable collaboration" where the privacy of the teacher's classroom is protected and there is no deep probing of issues of teaching and learning (Fullan & Hargreaves, 1996). This is a "weak" form of community (Little, 1990). Research suggests that strong professional learning communities are those focused on school change and improvement, engaged in what Little (1990) terms "joint work". Such work involves not only acquiring new knowledge (this centrally includes increasing teachers' pedagogical content knowledge; that is, their knowledge of their subject particularly from the point of view of how to teach it, as a significant part of enhancing practice) but also challenging and critiquing basic assumptions about teaching and learning. A professional community of teachers has, as its central

aim, school-wide or even beyond the school efforts to improve practice and, as a consequence, student learning. However, there is no established culture of a collective responsibility for teacher learning. Traditionally, teachers' responsibility is to their own students rather than to other teachers or the students of those other teachers (Grossman, Wineburg, & Woolworth, 2001).

The potential of electronic communication to support a professional learning community is not necessarily realised for a variety of reasons. Using online technology to create networks (in the case of FarNet this was curriculum resource pages and email lists of teachers who taught each subject) might qualify as a case of putting the cart before the horse (Schlager & Fusco, 2003). This refers to the idea that such use to actually *create* networks for a specific purpose may be precipitous. Among other things, it often ignores the greater potential of the Internet to *support and strengthen* existing communities of practice.

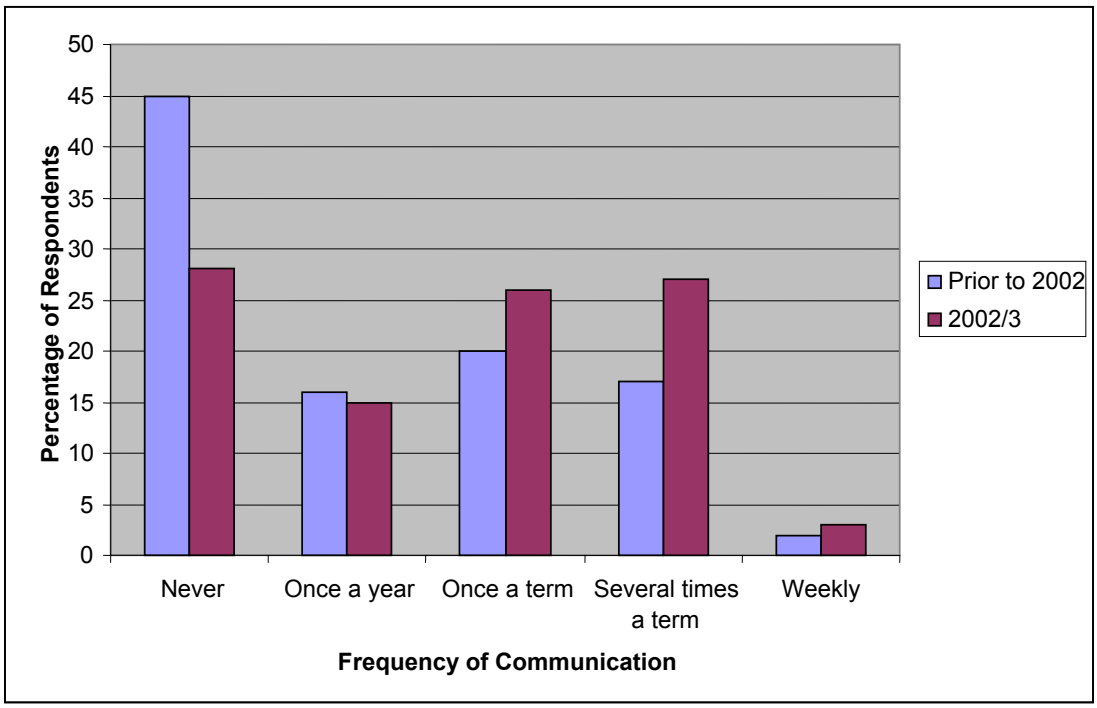
Although FarNet attempted to utilise the idea of linking teachers who shared a common interest in that they taught the same curriculum area, such could hardly be said to constitute an existing community. Traditional curriculum-based associations like the English Teachers Association or the Science Teachers Association could not claim to involve more than a small percentage of teachers. A curriculum leader interviewed felt that the FarNet structure should "*work in with our professional association – [although] the association has disintegrated*", that FarNet might help in trying to get it started again!

At the beginning of the FarNet project it was not common for teachers in one school to communicate with those in another. In the brief survey asking about the use of FarNet and the Internet, participants were asked to report the level of communication they had had with colleagues prior to FarNet (2002) and then since FarNet was implemented (2002/03). In both instances they were asked to report on a 5 point scale (1 = never, 2 = once a year, 3 = once a term, 4 = several times a term, 5 = weekly) how frequently they communicated with colleagues at other schools to discuss professional matters related to teaching and learning.

Of those participants who responded (n = 172), 45% stated they had never communicated with colleagues from other schools prior to 2002, while only 2% had communicated weekly. After the implementation of FarNet (2002/2003) the number of respondents who had never communicated with colleagues dropped to 28%. Still a small percentage (3%) reported that they were communicating on a weekly basis. There were increases, however, in those who communicated both once a term and several times a term between the two time periods. Figure 3.12 is a graphical representation of the differences between the two periods. This suggests that FarNet, or rather perhaps the widespread availability and use of email, has had an impact on the frequency of communication between respondents at different schools overall. Without intimate knowledge of the content of person to person emails it is not possible to determine the level and type of communication undertaken. For a professional learning community this communication has to move beyond the examples given at interview such as a request to borrow copies of texts or to find sheet music.

The ICTPD Cluster Milestone Report of November 2002 reports that link teachers (i.e. curriculum leaders and ICTPD co-ordinators) were "actively encouraging teacher use of emailing and developing an 'online community culture' across each school". Comments at interview suggest that some of the communication between individuals was concerned with NCEA. A monitoring of the listservs through 2002 and 2003 indicates that these were not used as anything other than a notice-board for announcements, suggesting that electronic communication was one to one rather than one to many or many to many as would happen within a virtual professional community.

Figure 3.12 Percentage of respondents at each level of frequency of communication through any medium



The idea that electronic communication might best build on existing communities was in part reinforced by the experience of at least one group within FarNet. FarNet's chosen organisational structure of curriculum groups with leaders whose primary role was to facilitate the development and sharing of resources, but also information and views about utilising technology in a particular subject area, implied a collective responsibility for teacher and student learning. But no curriculum leader conceived of his/her role as more than a conduit; they had little sense of what a professional learning community was or how it might function, and teacher development was not seen as their responsibility. In reality, the member schools in FarNet were often in competition with one another for students, as numbers are important in funding and retaining staff.

Two factors perhaps explain the differential success of groups. These are, firstly, the notion of the creation of web based resources and electronic communication fitting more successfully within an existing community and, secondly, the idea of collective responsibility not sitting easily with the reality of competition.

The most successful group in terms of the extent of resources posted and the level of reported use was the Maori curriculum group. The Maori curriculum site at one point (July 2003) had 120 separate documents on it with 13 links to other sites. This equates to about a third of the total resources and links posted within the 19 curriculum group pages on the FarNet site at that point in time (see earlier analysis of curriculum pages). Admittedly, there was a Maori Resources co-ordinator who collected and posted resources. While his role was similar to that of the curriculum leaders it was a full time position allowing the co-ordinator to focus his energies on ensuring resources were developed and posted. He was also able to devote time to upskilling teachers in their use of ICT. However, the point is that he still had to find people willing to give resources. Taking collective responsibility for children and their growth and development is a feature of Maori culture. So Maori teachers felt responsibility for all Maori students, regardless of the school they attended, or the subjects they took. They also felt collective responsibility for each other not just as teachers of Maori but as Maori teachers in general. "*Maori teachers as teaching anything ...*

I have got a Maori teacher who teaches science … And after the first year I found him helping with Te Reo Maori and that was neat." In addition, Maori teachers in the region tended to have strong associations through tribal affiliations or family ties to one another and to many other Maori in the wider community beyond the school. These associations, together with the sense of community that characterises Maori culture, clearly helped Maori curriculum leaders to locate resources and persuade teachers to share them more widely by posting them.

Therefore, a cart (here the FarNet notion of an electronic professional learning community) before the horse (here meaning strengthening – or changing – existing community practices) analogy seems apt. Utilising and strengthening existing ties and affiliations appear to assist uptake in terms of participation in a virtual community. We would argue that experience of a well-functioning professional learning community, either one already existing across schools or one within a school, may predispose teachers to connect, in this case to be prepared to share resources electronically.

But, further, we argue that it is very informative to extend the cart before the horse analogy. In fact, in FarNet, the cart was placed before several horses that, if addressed and harnessed collectively, may have facilitated more effective outcomes. These horses to be harnessed include, in addition to building on an existing community, the "solution to need" horse. This encompasses the notion that it is necessary for teachers to see a need for technology or, in this case, technology mediated professional communication and learning, before they will entertain the idea. They needed to buy into the idea of collective responsibility for one another and, by implication, for the wider body of students. Another horse, although these work as a "team", involves the idea of exposing teachers to the notion of deprivatising their practice, sharing it with others and being prepared to make changes. This may involve (as part of its livery!) supporting a climate of risk taking. In reality the cart appears to have been placed before several horses, all of which were needed to pull it!

In the FarNet project, along with being on a list with others who taught a subject, teachers were asked to post resources for others to access. This deceptively simple request of the teachers required a major shift in terms of deprivatising practice. Elmore (2000) points out that the traditional model of schooling does not readily allow for communication between the individual classrooms and the wider context within which teachers work. There is an emphasis on professional autonomy and the right of teachers to make detailed decisions about how and when the curriculum will be delivered and the methods by which their students will learn. Under this model, known as loose-coupling (Weick, 1976), teaching is seen as requiring a "high degree of individual judgment". This right of individual judgment, or professional autonomy, is closely guarded in many instances. The result is that teachers frequently work in "isolated classrooms, under highly uncertain conditions" (Elmore, 2000, p. 6).

This model of loose-coupling has serious implications for the implementation and sustainability of learning communities even within schools. Elmore (2000) suggests that it explains why most innovation in schools occurs in the structures around the school rather than within the classroom and why, where innovation does occur, it tends to be in isolated pockets and as the result of volunteerism. Volunteerism leads to innovations that are in tune with the personal values and dispositions of individual teachers (Elmore, 2000) rather than being connected to any collective goal or purpose such as that of the FarNet community as a whole. This concept of volunteerism can be seen among the curriculum leaders in FarNet who, without a strong guiding purpose and shared understanding of their role or of broader outcomes, focused on their own ideas and visions. One of the curriculum leaders felt his site had been successful because he "*had made the resource … [he] had his vision and liked what [he] was doing*". In reality, he would have created the resources regardless of FarNet; FarNet was just a convenient vehicle.

The issue for FarNet, and other such learning communities, is that teachers are often unwilling to share resources. As one curriculum leader stated: "*one of the biggest things you battle with is a [lack of] willingness to share*". Only six of the 19 curriculum pages on FarNet had resources supplied by other than the curriculum leader. Similarly, almost no one other than the FarNet managers or curriculum leaders posted to the lists. This reluctance can be attributed to at least two concerns. The first is that teachers feel protective of what they create because of the work involved and could "*feel ripped off if someone just comes in and whips that from under their nose*". This feeling is exacerbated between schools where teachers may feel they are helping out another school with no subsequent benefit to them or their students. As one interviewee explained, "*Teachers were saying, 'This is the resource I made. I am not going to share it with X school. What have they done?'* "

The second is a concern by some teachers that their work might not be good enough. Laying one's work open to scrutiny by colleagues requires a fairly high degree of self-efficacy and an ability to take risks and to accept criticism. One curriculum leader reported that when asked for resources to post, teachers responded, "*Oh, it is not really good enough and I don't want people to think that it is really bad.*" Another mentioned the fact that "*teachers want their resources to be perfect*".

A willingness by teachers to share and to reveal elements of their practice requires a climate conducive to the operation of a professional community. Teachers are more willing to deprivatise their practice when they know the environment is safe, supportive and constructive (Grossman, Wineburg & Woolworth, 2001). There is no simple checklist but central notions in building the "set of obligations, opportunities and resources for teacher learning" (Little, 2000, p. 257) include system thinking or collective responsibility, forms of ongoing collegial interaction and environmental conditions like a supportive principal and social trust (Toole, 2002 cited in Toole & Louis, 2002).

Within one of the schools in FarNet, there was a strong focus on teaching and learning led by the principal who was passionate about pedagogical change and meeting the needs of all students. As a result, a professional learning community was beginning to form within the school. Staff had professional development related to the integration of ICT and pedagogical change. Teachers were also encouraged and helped to create resources and place them on the school intranet for students and colleagues and a part of their appraisal involved the creation of ICT resources. They were willing to do so because they "*felt safe in our little community first*". The result was a willingness to put the same resources onto FarNet for a wider audience.

Our argument here is not that teachers lacked skill in the use of ICT but, rather, that they may have lacked specific skills or knowledge as well as held certain dispositions about online learning. It was their least preferred method of professional development even at the end of the ICTPD.

Towards the close of the FarNet project, it was clear that teachers were prepared to use the Internet to find resources. In 2003, 97% had accessed the Internet in relation to professional work while a slightly lesser percentage reported accessing the FarNet site (81%). These results, along with those from the ICT Professional Development data[3] suggest that the majority of teachers are relatively comfortable with accessing material online to use in their professional work. They were also moderately confident with email. In terms of the use of email, 41% used email regularly and 37% described themselves as confident users.

[3] The authors were provided with an electronic copy of the raw data for the FarNet schools from the baseline ICTPD survey, which they analysed as part of their evaluation of the project.

The inference, however, is that they were not as comfortable with the Internet or email lists as a tool for collaboration as they were with using it as an online learning tool. Unfortunately, the baseline ICT Professional Development (PD) survey (Ham, 2001) did not ask teachers about the level of use of computers for professional communication and collaboration, although it did ask about preferred PD activities in relation to ICT. About a third of participants were ambivalent about the use of listservs, with no feelings either way. Small percentages had strong views: 10% said they would hate it and 13% felt it had strong appeal. Overall, of the 11 types of professional development suggested, listservs were ranked tenth with only professional reading having a lower mean level of preference. The same holds true after the ICTPD so there was no change in views. Release time to discuss and translate new ideas and strategies into unit plans with the help of a mentor was clearly the most preferred PD, followed by on the spot support (both, it is interesting to note, likely to be best sourced from within the school community).

There was a different story in terms of overall integration of ICT into the classroom with 32% of respondents stating they had not yet blended ICT into their student learning activities while only 6% stated that all, or almost all, their units of work had an ICT component. Only 13% of respondents to the baseline survey reported they were able to create web pages using either HTML or an editing program, while a third reported they were able to access information and follow links and a quarter understood advanced search techniques. This number had increased from 13% to 22% at the end of the ICTPD contract.

Teacher ICT skill level generally did not seem to be a limiting factor in terms of resource production and email communication. Rather, it was teachers' lack of experience in the use of ICT in classrooms, and web-based resources in particular, and their likely limited knowledge of what might constitute an adequate electronic resource for the classroom, that may have contributed to their reluctance to attempt to produce such for sharing. This may also partially explain the feeling that what they were able to produce may not be adequate. In terms of professional learning in ICT, there is some evidence that teachers were not favourably disposed to the use of the Internet as a tool for professional development.

From our data, there does not appear to have been widespread "buy in" to the notion of FarNet learning communities in terms of such a community being perceived as something needed to solve existing problems. Indeed, in some ways FarNet appears to have been a solution looking for a problem. However, some did view what FarNet offered as a way of meeting their needs. In the FarNet project, the curriculum resources were, in part, envisaged as a supplement to teacher pedagogical content knowledge. In isolated areas with small numbers of senior students, teachers may "teach" several subjects that are not part of their disciplinary background and training or, alternatively, may provide face to face support for students who take subjects by correspondence. For example, in one school a senior teacher was responsible for seven different curriculum subjects at Years 12 and 13 and had accessed resources. Another example came from a teacher who had only taught primary school English and was now teaching senior English. FarNet has enabled this teacher to be mentored by an experienced teacher in a nearby school. Some smaller schools reported such "*little linkages*" among themselves for support and the sharing of resources and ideas.

Maori teachers expressed the real need for them to be part of an electronically supported community:

> *I think if we weren't sharing we would be lost, the Maori teachers if we don't share and get in touch with one another… Maori teachers used to feel isolated but with this, with FarNet, you don't.*

The bottom line in terms of building an electronic community such as FarNet was that teachers had to not only perceive the need but recognise that Internet resources, exchange and collaboration via FarNet were a viable solution to the perceived need. One curriculum leader interviewed saw FarNet as supporting those who wanted to teach in particular ways or move towards certain pedagogical approaches.

> *It [FarNet] will go some way to being a catalyst to it [to change]. That is all it will ever do; it will make the job easier. But what has really got to come is the want to change to constructivism, [to be] experimental, where you have different layers inside your classroom – where you will have different activities inside your classroom, where it is differentiated between levels. If you want that to happen, FarNet is going to enable that to happen really big time… If you believe that you get better learning with a piece of chalk and a blackboard and you are going to give notes then don't get involved with FarNet.*

The experience of FarNet suggests that there are a number of interrelated issues to address in order to maximise the likelihood of success of any online professional learning community. Considerable groundwork may be needed. As Fullan and Hargreaves note: "Some contrivance is necessary in the establishment of virtually all collaborative cultures. They don't happen by themselves" (1996, p. 58). First a clear need has to be identified for the electronic community. Further, there has to be a shared understanding of the value of the online community in meeting the need. FarNet conceivably could be a powerful tool to address several needs of teachers and their students in the Far North; however, the introduction and implementation did not ensure that ordinary teachers shared, let alone drove, the vision.

There are preconditions that enable or facilitate the development of professional communities and these include openness to improvement (part of recognising the need for it), trust, mutual respect, availability of expertise, supportive leadership and socialisation into the community (Kruse, Louis & Bryk, 1995). The notion of collective learning and open consideration of practice should be developed at some level, as shown by one of the school examples considered in FarNet, before expecting teachers to be willing to share aspects of their practice with a virtually unknown audience. In FarNet, the expertise available needed to be applied to the development of particular knowledge and skills required in the envisaged community, namely, those of constructing electronic resources from the standpoint of experience of the use of such in the classroom and from knowledge of how to create them. Building a professional learning community is difficult to achieve within a school, let alone across schools, let alone virtually. Building on or strengthening an existing community is one way to approach this while supporting and guiding the building of communities within schools is another. Pursuing both of these avenues would enhance the impact of initiatives like the vision of a FarNet learning community.

Summary

Key points from this sub-section are:

1. A number of factors appear to have to be already in place before a professional learning community can be successfully created online. These include a perceived, and agreed to, need for the community, a feeling of security or trust that would allow for both the deprivatisation of practice and risk taking and a collective responsibility for the community as a whole.
2. A likely model for success is to build on an existing community. In FarNet the most prolific resource producers were members of an existing community of Maori teachers.
3. Reportedly communication between teachers across the FarNet schools appears to have increased. However, there is no indication of this on the FarNet listserves. Where communication has been reported in interview it tends to be based on immediate needs, such as the sourcing of texts, rather than on professional learning.
4. Two main explanations were offered for the lack of sharing. The first of these was a sense of 'not getting anything back' and the second related to a sense of their work not being good enough.

Section 4: Impact of FarNet on Teaching and Learning Practices

This section presents data on how teachers report using the Internet, as the rationale for broadband installation, that was part of this project, was to provide access to such. There are also data presented concerning how teachers report using ICT more generally for teaching and learning. The first part concerns the use of the Internet for professional purposes and the use of ICT for planning, preparation and administration. The second part considers use related to classrooms in the form of incorporating ICT into units of work in teaching and the use of ICT with students.

PARTICIPANT PROFESSIONAL USE OF ICT

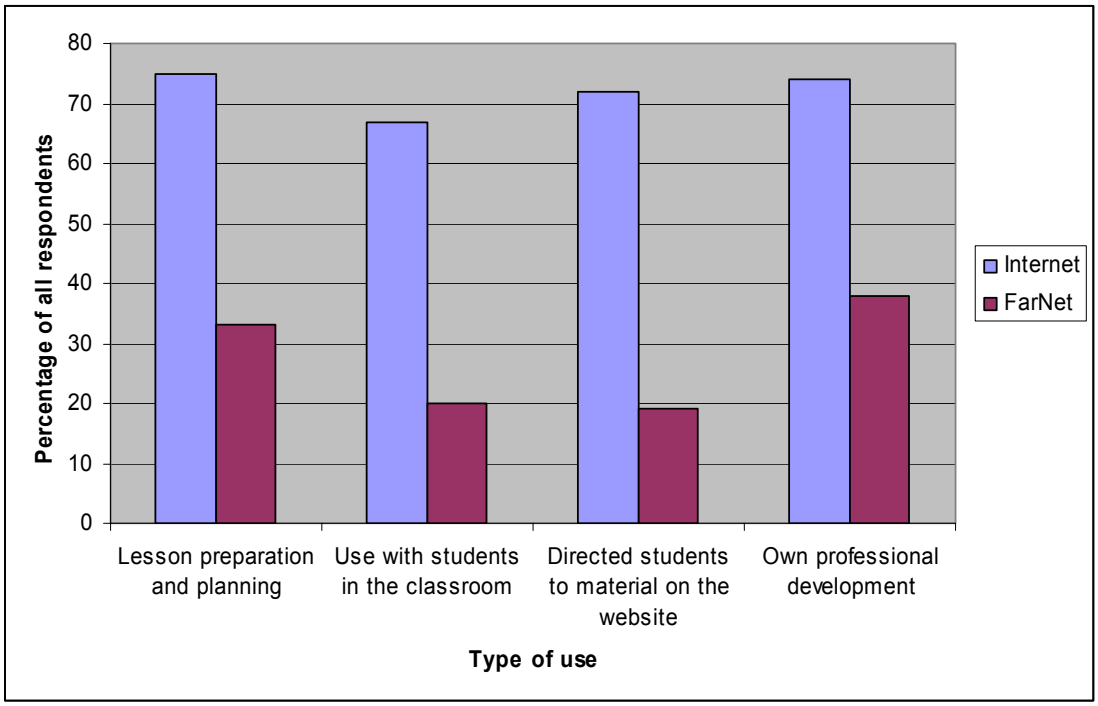
Respondent Use of the Internet

In the brief survey designed to find out specifically about Internet and FarNet use, we asked several questions about teacher use of the Internet, excluding the FarNet website (221 teachers responded). Here we consider the results from the survey regarding Internet use and then compare these with those discussed earlier (Section 3) in relation to FarNet.

Nearly all respondents (97%) stated that they had accessed the Internet in relation to their professional work in 2003. This is compared with 81% of respondents who had accessed FarNet in the same year. These results suggest that the majority of respondents are relatively comfortable with accessing material online and the use of both is relatively common. For those who had not accessed the Internet at all, the two reasons given were lack of time or insufficient skill to do so.

Participants were then asked how they had used the material they accessed. Only 3% of respondents to this question stated they had not used any material. This can be compared with 29% who responded in the same way regarding FarNet. The most commonly given use of material found on the Internet was "*lesson preparation and planning*" (n = 166). This was closely followed by "*professional development*" (n = 163). The third ranked use was "*directed students to material on the Internet*" (n = 159). The least cited use was "*with students in the classroom*" (n = 149). Figure 4.1 compares the way in which material on the Internet is used with that on FarNet.

Figure 4.1 Percentage of all respondents (n = 221) for each type of use of material

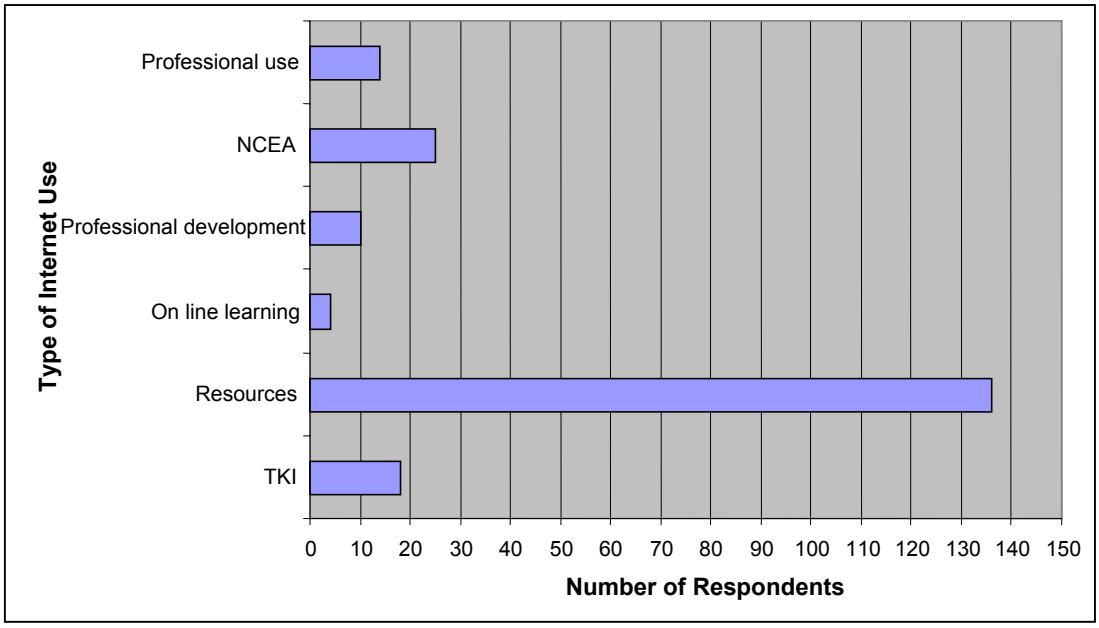


Note: The response format meant that a non-response indicated no use.

What this suggests is that while the percentage of respondents accessing FarNet for their professional work is not markedly less than that of the Internet in general the level of use of material is considerably less. It also should be noted that 8% of respondents used the Internet for other reasons, primarily accessing NCEA material.

Participants were asked to describe what they had used on the Internet as specifically as possible. As with the parallel question regarding FarNet, few answers were specific. The descriptions given were again coded into categories. There was more variety in the descriptions given for the Internet than FarNet and a total of six categories were used in the coding. Again a number of responses (14) were discarded as being too vague to code or as being irrelevant. This left a total of 207 responses for coding. Figure 4.2 is a graphic representation of the number of responses within each category.

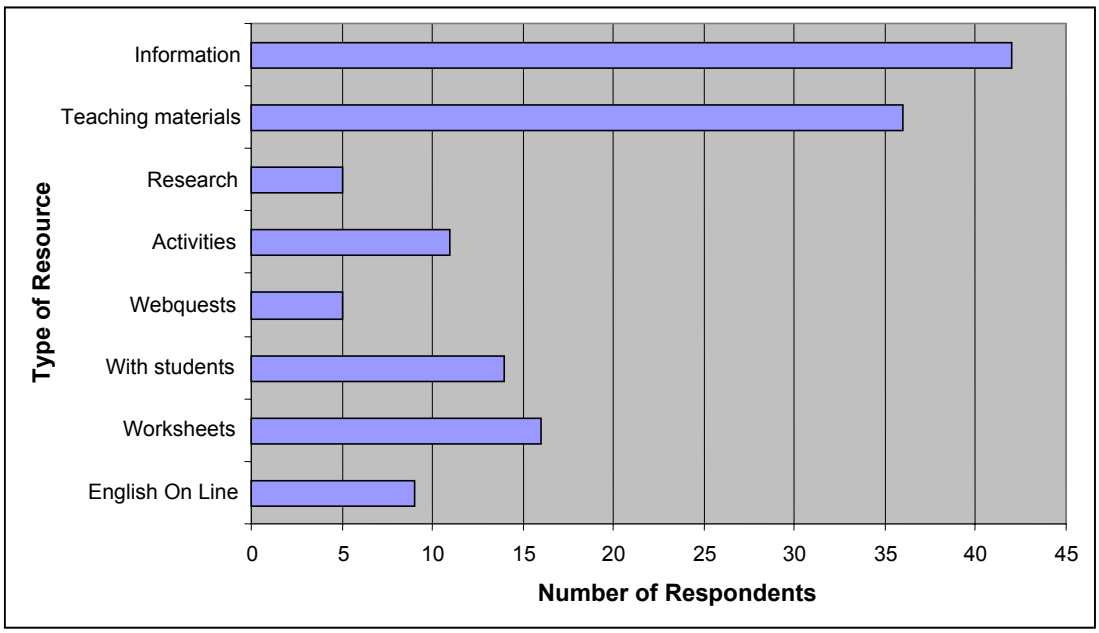
Figure 4.2 Number of responses within each category of Internet use



As with FarNet, the category most descriptions were coded into was resources (66%). The second most frequently described type of material was related to NCEA or NZQA material found on the NZQA website (11%). Respondents also accessed material (unspecified) from TKI (8%) and visited the websites of other professional organisations or communicated with colleagues, coded as professional use (7%). The least described types of use were professional development (5%) and online learning (1%). This level of response is consistent with teachers' views about the forms of professional development they favoured where listservs and online learning were lowest ranked.

The dominance of the resources category meant a second level of coding was undertaken for the responses within this category. In line with analysis of the FarNet data, this was done by subject where it was given and by type of resource. Some responses were coded into each type of sub-category. Figure 4.3 displays the number of responses within each type of use sub-category.

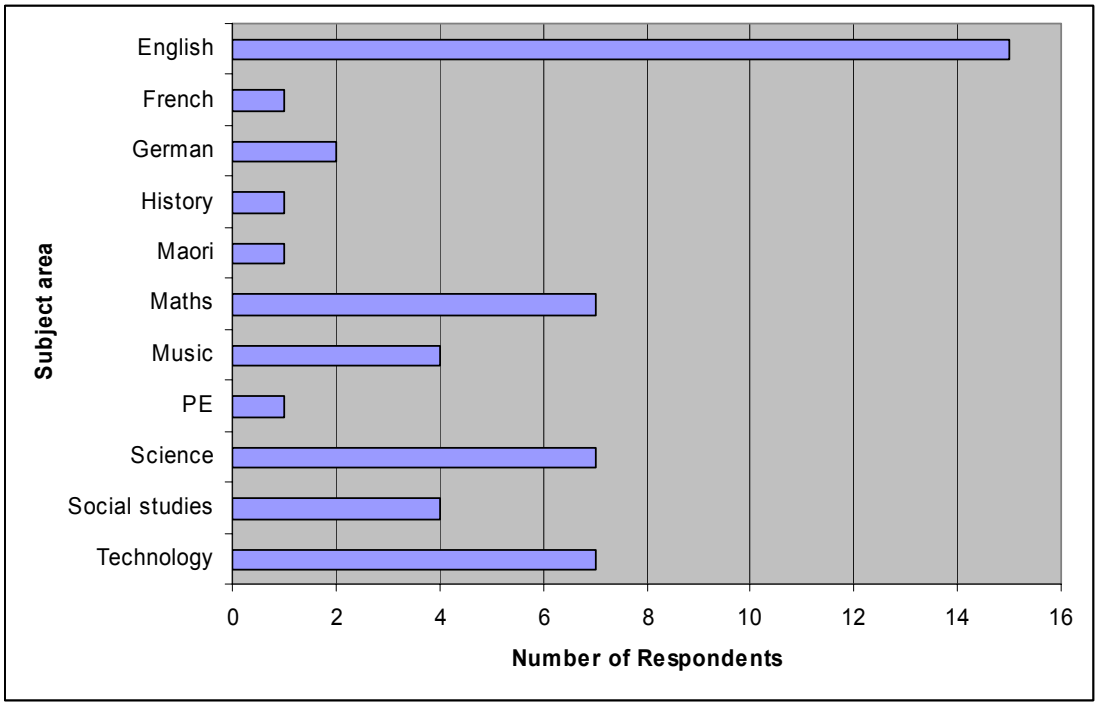
Figure 4.3 Number of responses within type of resource sub-category



Respondents most frequently reported that they had accessed information of some kind on the Internet (n = 42). This could be either information for students to use in research assignments or resource material for their own use when developing lesson material. The next most common type of material was general teaching materials (n = 36) such as slideshows on PowerPoint, teaching ideas, notes or lesson plans and unit outlines. The English Online website was specifically mentioned by 9 respondents while 11 stated they had used activities such as puzzles, tutorials or interactive sites for students to use.

The descriptions given for Internet material suggest that there are similarities in the types of material used from the Internet and FarNet. In both cases the emphasis appears to be on general teaching materials rather than interactive material that students access and use themselves. The Internet is also seen as a better source of information than FarNet. Given the type of material on FarNet this is not surprising. Figure 4.4 displays the number of descriptions that stated a specific subject area.

Figure 4.4 Number of descriptions involving specific subject areas

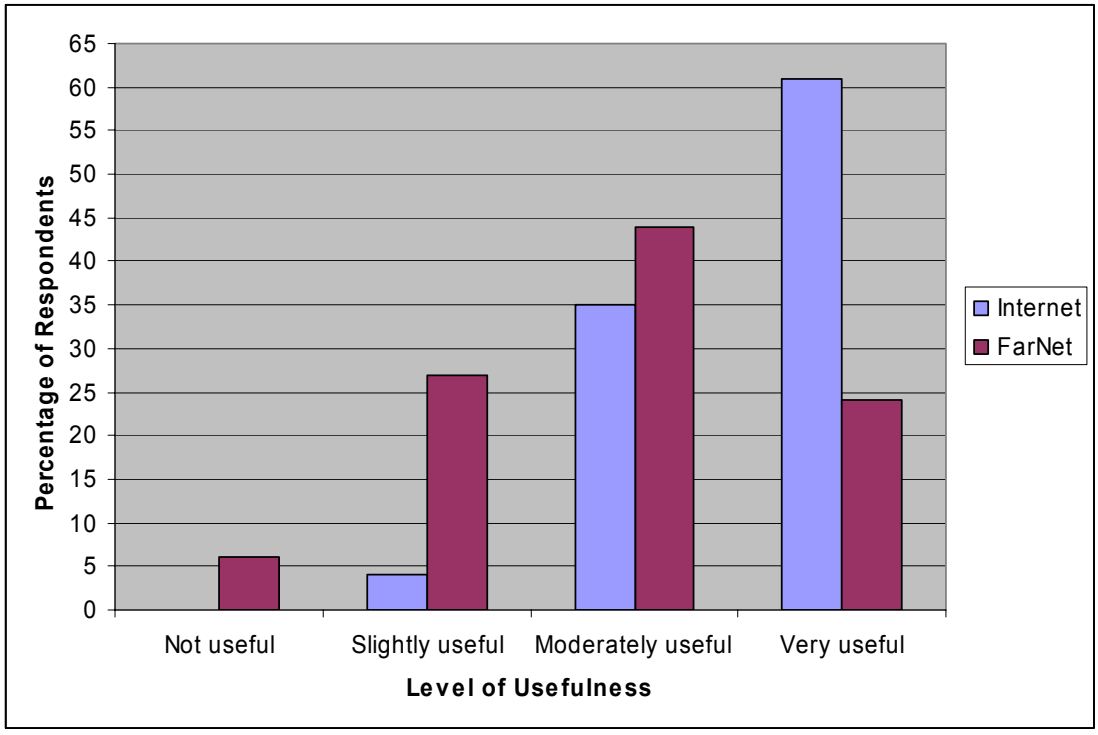


There were some differences both in the subject areas mentioned and the frequency with which they were mentioned between responses referring to the Internet and to FarNet. The most commonly cited subject area for the Internet was English, which was only ranked fourth for FarNet use. This was followed by Maths, Science and Technology that were the focus areas for the FarNet project. Maths (together with Maori) was the most frequently cited subject area for FarNet (examples given include Mathematics Online) with science subjects also scoring highly, particularly Biology. Technology was not mentioned on FarNet but was up with Science and Maths for accessing resources on the Internet. Understandably, there is limited mention of Maori for the Internet while it rates at the top with Maths in terms of level of use for FarNet. It would appear, therefore, that for Maori teachers FarNet does provide a resource they do not otherwise have. While other languages, French and German, are mentioned in the Internet descriptions these do not appear in the FarNet responses. These results largely reflect the quality and number of resources

available on FarNet. Where there are a lot of resources such as for Maori and Biology these subjects have been cited in the FarNet responses.

As in the FarNet section of the survey, participants were asked how useful they found the material on the Internet and then how easy they found the Internet to use. Figure 4.5 shows a comparison of the frequency for each level of usefulness on the Internet compared with FarNet. No respondents stated that they had found material on the Internet not useful (compared with 4% for FarNet). Over half of the respondents (61%) found the material on the Internet very useful (compared with 24% for FarNet). This suggests that respondents find the material available on the Internet far more useful than that on FarNet, which may explain the relatively low level of use of material from FarNet even when the site has been accessed.

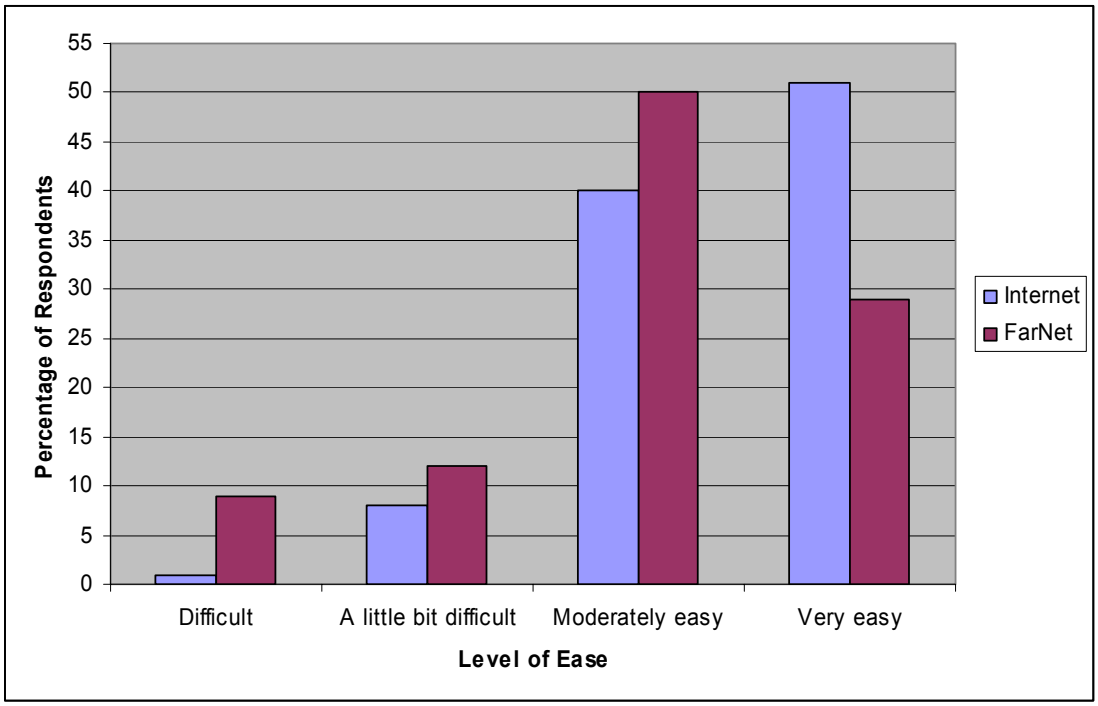
Figure 4.5 Percentage of respondents reporting each level of usefulness



Note: These percentages are based on the number of respondents to each question. For FarNet n = 135, for the Internet n = 197. The missing data can at least partially be explained as those who do not use FarNet and/or the Internet.

Figure 4.6 compares the level of ease of use of the Internet and FarNet. Only 1% of respondents found the Internet difficult to use while 9% thought FarNet was difficult. Similarly 51% found the Internet very easy to use while 29% thought the same of FarNet. These results imply that in order to increase the use of FarNet it will be necessary to make it easier to use as well as ensuring the material on it is more useful to respondents. The earlier reference to FarNet being behind closed doors may have been alluding to not only the password access but also the layered structure of FarNet making it unwieldy to navigate in many cases.

Figure 4.6 Percentage of respondents at each level of ease of use



Note: These percentages are based on the number of respondents to each question. For FarNet n = 161, for the Internet n = 201. The missing data can at least partially be explained as those who do not use FarNet and/or the Internet.

Use of ICT for Planning, Preparation and Administration

The other aspect of professional use that overlaps to a certain extent with the use of the Internet is the use of ICT for the professional aspect of teaching that involves planning, preparation and administration. In the final ICTPD survey (September 2003) participants were asked to indicate the frequency of use of ICT in their planning, preparation and administration both before and after the period of ICTPD. They rated a number of dimensions using a 5 point scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). As Table 4.1 shows, there were differences in the levels of use in this area of planning, preparation and administration at the two points in time, before and after the professional development. Paired-sample T-tests showed these all to be significant. Overall, the mean level of ICT use increased from 2.48 (midway between rarely and sometimes) to 3.17 (just over sometimes).

Table 4.1 Comparison of levels of use of ICT for planning, preparation and administration

	Mean		
	Before	**After**	**Difference**
I access(ed) the Internet to get official documents from the Ministry, NZQA etc	2.65	3.63	0.98
I access(ed) the Internet for assessment items	2.49	3.37	0.88
I access(ed) the Internet for finding and collecting lesson ideas	2.78	3.54	0.76
I use(d) word processors or a desktop publishing package to produce task sheets, tests, handouts etc	3.33	4.01	0.68
I access(ed) the Internet for professional readings, subject association newsletters etc	2.14	2.74	0.60
I produce(d) lesson materials using digital camera, video editing, digitising, scanner etc	1.90	2.43	0.53
I get/got lesson content materials from electronic encyclopaedias on CD ROM	2.05	2.49	0.44
Overall	**2.48**	**3.17**	**0.69**

The three types of use where there was the greatest improvement in levels of use all involved the Internet. Prior to the ICTPD programme 27% of all respondents had "never" accessed the Internet for official documents. This number decreased to 8% afterwards. Similarly, the percentage of respondents reporting that they had "rarely" done so dropped from 23% to 6%. A much greater percentage of participants reported either "often" or "always" using the Internet with an increase at these levels from 28% to 59%. The second highest improvement was in the use of the Internet for assessment items. As with use for official documents there were decreases in the percentages of participants both "never" using (32% to 12%) and "rarely" using (25% to 16%). There were also substantial increases in the number of participants who reported either "often" or "always" using the Internet in this way (27% to 52%). The pattern was again similar for use of the Internet for finding lesson ideas with an increase from 30% to 53% in respondents reporting either "often" or "always" and a drop of 14% (22% to 8%) in the number of respondents who "never" did so.

These findings suggest a greater confidence in the use of the Internet and could also be reflected in the increased access of FarNet. However, the fact that levels of use are much lower for professional readings and subject association newsletters also implies that part of the reason for increased use is that there is an imperative to do so, perhaps because of the amount of information that is only available on sites such as NZQA and TKI.

Table 4.2 displays the mean levels of ICT use for administrative purposes both before and after the ICTPD. The overall mean level of use rose from "rarely" to "sometimes".

Table 4.2 Mean reported levels of ICT use for administrative purposes

	Mean		
	Before	**After**	**Difference**
Writing reports for parents	2.44	3.74	1.30
Recording or calculating assessments, marks and grades	2.58	3.74	1.16
Email correspondence with colleagues on administrative matters	2.22	3.23	1.01
Recording students' running records	2.31	3.18	0.87
Accessing staff notices	1.70	2.31	0.61
Recording absences	1.46	1.79	0.33
Overall	**2.12**	**3.00**	**0.88**

There was a strong increase in the mean levels of use for writing reports of more than one point on the scale. Both the recording, or calculating, of assessments, marks and grades and the emailing of colleagues on administrative matters also increased overall by just over one level. These three types of use – reports, assessments and emailing – are often mandated by school management in the early stages of ICT integration in order to force teachers to use computers and, hopefully, to become more comfortable with them. This appeared to be the case as reported in several FarNet schools.

While 46% of all respondents did not use computers to write reports for parents prior to the ICTPD programme only 17% reported non-use afterwards. The number reporting "always" rose substantially from 19% to 48%. These results are likely to be the result of mandated computer report writing using programs such as Classroom Manager. Once a decision has been made by management to introduce computer-based reporting, all teachers generally have to comply. Before the ICTPD programme 34% of all respondents were not using computers for recording or calculating student marks etc. This dropped significantly to 9% afterwards, suggesting many schools focused on this as one area of integration into school practice. The number of participants reporting they "often" did so went from 14% to 32% while the number reporting "always" similarly rose from 16% to 32%.

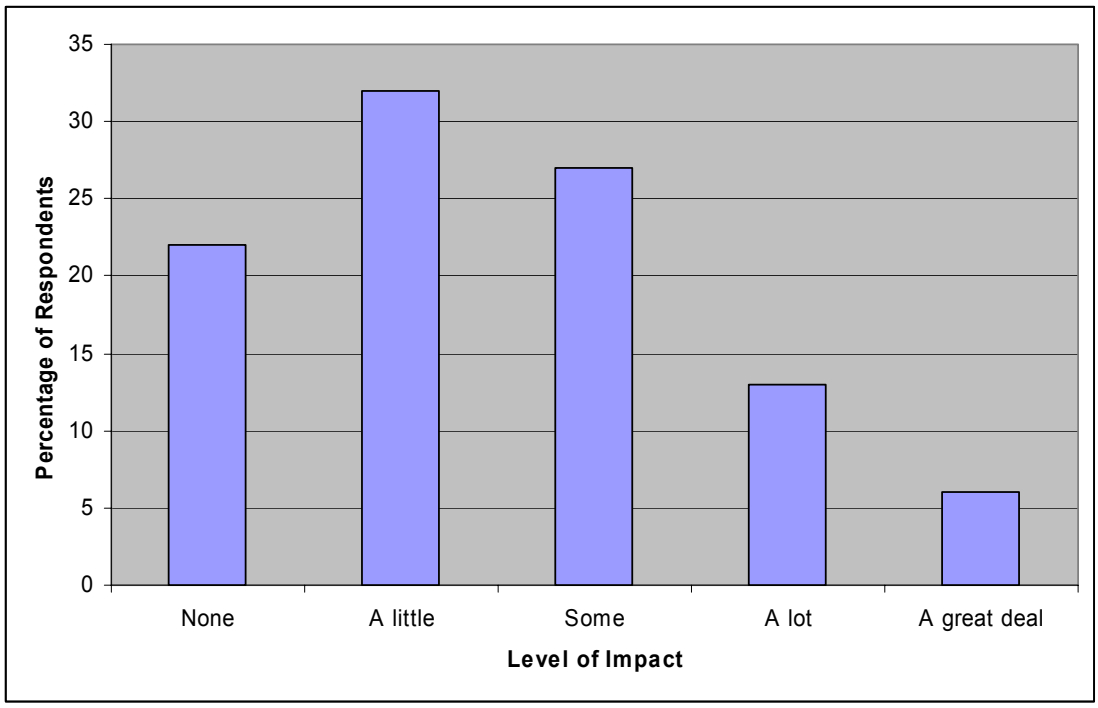
Participants who reported that they never emailed colleagues dropped from 43% at the time of the first ICTPD survey to 18% at the end. Those reporting either "often" or "always" rose from 18% to 49%. The introduction of intranets in many schools and an emphasis on electronic communication would explain these changes. (Note: The question did not differentiate between within school emailing and emailing to colleagues in other schools.)

The extent to which the changes in use for professional purposes were attributed to the ICTPD undertaken is interesting. Participants were asked to what extent the increase in use described in this section could be attributed to the ICTPD programme. The results here are surprising with half of the respondents (51%) reporting that it was "partly" attributable while 21% reported it was not all attributable. Only 27% reported that it was either "largely" or "completely" attributable. The mean for this question was 2.87, which is approaching the "largely" rating. One explanation for these findings may simply be that, with the increases in hardware and with broadband as a result of the FarNet project, these teachers had better access to computers for use for these purposes. It may also be that the use in these areas is now mandated by school policy and, as discussed in an earlier section, teachers do not necessarily perceive help with mandated uses of ICT, such as report writing, as a form of professional development.

Impact of FarNet on Respondents' Professional Lives

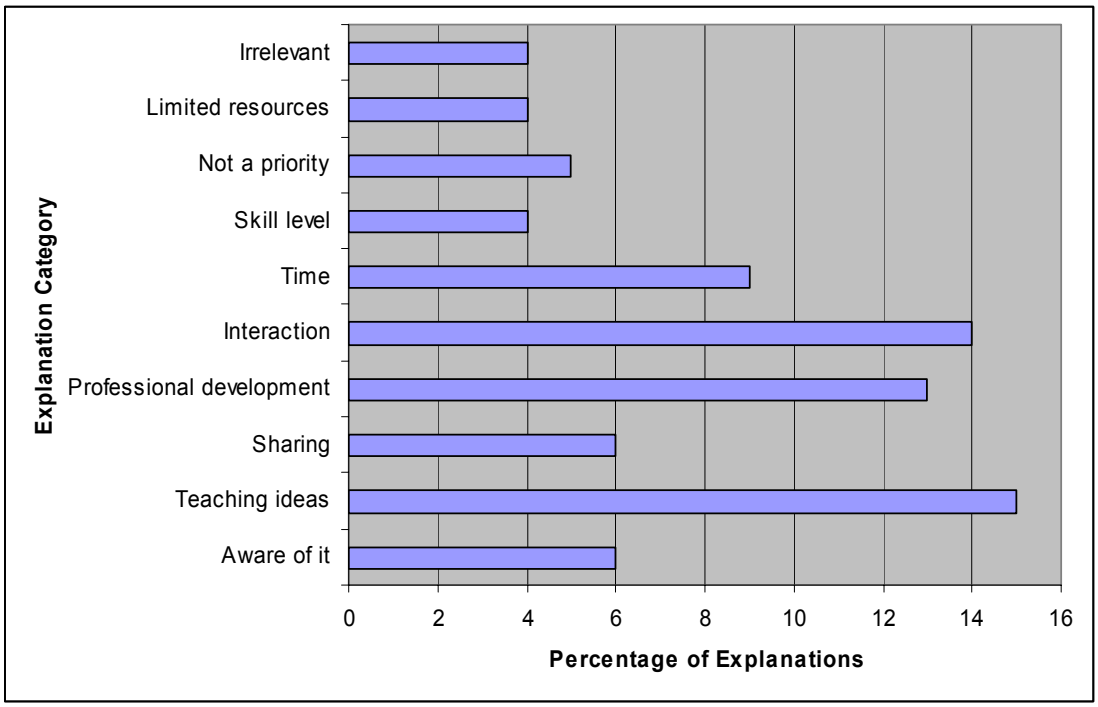
In an attempt to summarise the effect of FarNet, there were some questions that asked participants more generally about the overall impact and type of impact FarNet had had on their professional life. Teachers were asked to report how much impact they felt FarNet had had on their professional life on a 5 point scale (1 = none, 2 = a little, 3 = some, 4 = a lot, 5 = a great deal) and then to explain the level reported. Of those who responded (n = 177), 22% reported that FarNet had had no impact while 6% reported a great deal. Over half (54%) responded with either "none" or "a little". Figure 4.7 is a graphic representation of the frequency for each level of impact.

Figure 4.7 Percentage of respondents reporting each level of impact



There were 129 explanations offered for the level of impact. Of these 76 (59%) could be described as explaining a positive impact while 53 (41%) were negative. Coding of the responses to the request for explanations for the level of impact found there were three main categories of reason for a positive impact. These were teaching ideas, interaction with others (interestingly) and professional development. The most common reasons for a poor level of impact were time and the fact that FarNet was not a priority. In total, there were 21 groups of explanation offered. However, many were coded less than five times and these were regrouped into an "other" category that accounted for 20% of all responses. Figure 4.8 is a graphic representation of the percentage of all explanations coded within each of the 10 main categories.

Figure 4.8 Percentage of all explanations of impact of FarNet offered within each coding category



This shows that the most frequently used categories were teaching ideas (15%), interaction with others (14%) and professional development (13%), all of which were explanations for positive impact. Participant comments within these categories included:

- *useful ideas for teaching*
- *added ideas for my delivery of topics*
- *In terms of communication it has helped me improve and increase my networks with others.*
- *I have attended conferences as a result which have been very useful professionally, encouraged me to improve IT skills.*
- *the opportunity to use technology and upskilling myself on how to access available resources.*

Time was the next most commonly used category of explanation. As mentioned in other sections of this report time is perceived by many respondents to be a major issue in terms of their use of FarNet. In 9% of all explanations offered respondents reported that time was the reason FarNet had had little impact on their professional life. Comments within this category included:

- *shortage of time to utilise facilities*
- *time-consuming to access information*
- *time needed to go through resources and decide about usefulness.*

For some respondents (6% of explanations) the sharing of resources had had a positive impact on their professional lives. For others (also 6% of explanations) simply being aware of FarNet and perhaps having a look occasionally was provided as an explanation for the level of impact.

Among the reasons for a poor level of impact were that they had not made FarNet a priority, their skill level was poor, there were limited resources or FarNet was irrelevant. Within the "other" category are explanations such as they have not used it enough for it to have an impact, they have not been teaching long or they have only just moved to the area.

USE OF ICT FOR TEACHING AND LEARNING IN THE CLASSROOM

Incorporating ICT Based Activities into Units of Work and Reported Effect on Teaching

In line with the sentiment expressed by one principal who felt that FarNet had definitely "*forced people to look at the way they teach*", interviews provided some evidence of a feeling that ICT could "*enrich the sorts of things that you could do with students … Like getting students to goal set … and monitoring their progress against their goals … And not always standing up in class, chalk in hand.*"

In the ICTPD follow-up, or post survey, teachers were asked to indicate the perceived effect on their teaching of incorporating ICT activities into their units of work in a number of areas: workload, ability to teach the class as a whole, ability to individualise teaching for their students, the level of stress in teaching, and the level to which their teaching is student centred.

Half of the participants (50%) reported that their workload had not been changed in any way through the inclusion of ICT based activities. An increase in workload was reported by 40% of respondents, although very few thought the increase had been great (3%). Only 10% reported that their workload had decreased to any extent. The implication is that where ICT is used to any extent there is likely to be a perceived increase in workload. This may be due to the add-on nature of much of the work done using ICT.

Nearly half of the respondents (45%) also reported that there had been no change to the level of ease of teaching the whole class. One explanation for this could be that there had been no fundamental change to teaching practices and participants were merely doing the same things with a new tool. Over a third (37%) felt that it was now easier to teach the whole class, although not to any great extent.

Incorporating ICT based activities appears to have slightly more impact on the level of ease in individualising teaching for students with 51% of participants saying it had become easier to do so. However, 45% felt that it made no difference. Again, this is probably a reflection on the type of activities and teaching practices being employed. Where participants felt they were already providing individual learning for their students ICT might not have been perceived to have an impact.

ICT based activities appear to have had little impact on how stressful participants find teaching with 55% stating that including ICT did not make teaching any more stressful. Where ICT was perceived to have an impact on stress level, teachers were almost equally divided over whether it is increased (19%) or decreased (26%). Whether teaching was more or less stressful would depend to a large extent on the self-efficacy of participants and their belief that they can cope with any technical or behavioural issues that might arise due to the inclusion of ICT.

Over half of all respondents (54%) stated that their teaching was more student centred as a result while 11% felt that it was much more student centred. There were also a number of participants who felt that their teaching was no more student centred than before.

These results suggest that, for these teachers, the inclusion of ICT activities into units of work has not had a major impact on their teaching. Where there has been an impact reported, the extent has not been great, with no more than 10% of respondents ever reporting a marked increase or decrease. This suggests that while there has been perceived change it has not been of any magnitude and, in reality, there may have been no fundamental shifts in teaching practices even through the inclusion of ICT activities.

Participants were also asked in what other ways, if any, incorporating ICT based learning activities into units of work had changed their teaching. Given the results above, the extent of change is likely to be moderate for any of these. Table 4.3 displays the results of coding their responses into broad categories.

Table 4.3 Changes in teaching due to incorporation of ICT into units of work

	No. of responses within each category	% of total No. of responses
None	11	19
Student centred	9	15
Other	9	15
Resource presentation	5	8
Organisation	5	8
Student learning	4	7
Student motivation	4	7
Information	3	5
Diversity	3	5
Teaching style	2	3
Classroom culture	2	3
Attitude	2	3

Of the 59 comments offered about changes in teaching, 11 of them (19%) were coded as either None or Not Much change. In some cases reasons were given such as:

- *I have been introducing literacy based work; it has not involved any ICT preparation.*
- *If it was possible they are very interested and keen but the number of computers and the time is very limiting.*
- *I would love to be so competent and confident that these could be included in my classroom programmes, but I just am not!*

Nine comments (15%) directly referred to a change to more student centred learning. These included:

- *My teaching has become in part a discovery-based experience for students.*
- *more opportunities for independent learning for my better students*
- *greater student responsibility for learning.*

A further 15% of comments were coded in the category "other", in that they ranged widely. These comments were a mix of positive and negative in nature. Examples of the responses included in this category are:

- *encouraged to use ICT more myself*
- *have had to spend more time preventing access to undesirable sites than I have on actual teaching*
- *valuing time available in computer suite!*
- *frustrated if when the computer systems remained in a state of disrepair for extended periods of time*
- *more resources to manage – i.e. wheel out computer, sort out cabling, fix glitches, etc. as same time as deal with other students' individual programmes.*

A number of comments about changes in teaching as a result of incorporating ICT were directly related to student learning and student motivation (7% each). Examples of the responses within these two categories were:

- *more challenging and exciting – get more involvement from whole class*
- *They have more ownership/enthusiasm and learning is stronger.*
- *more exciting outcomes.*

As can be seen from Table 4.3 the responses covered a range of themes. The following are a selection of comments from the remaining categories.

- *I am enthusiastic about using ICT so that has had a positive effect for me and students.*
- *They can look at the screen for a change instead of looking at me all the time.*
- *Planning to use Internet information has enhanced it. As an isolated school I appreciate the contact in this way.*
- *…need to be far more organised beforehand especially getting projector up and running or establishing a phone link.*
- *Basically I have well written models of work that I have downloaded and printed for class use.*
- *When I can use the ICT suite it does reduce teaching by not talking too much.*

Use of ICT with students

In an effort to probe further about the use of ICT with students, teachers were asked in the final ICTPD survey to indicate the extent of ICT integration into their work with students. They did this by indicating the proportion of their work that contained ICT based learning activities before and after the ICTPD programme. The scale used was 1 = all or almost all units, 2 = most units, 3 = several units, 4 = one or two units and 5 = no units. The mean level of use before the ICTPD was 3.49 (midway between one or two and several units). Afterwards it was 2.81 (approaching several units). While 9% of respondents reported that all or almost all of their units contained ICT based learning activities prior to the ICTPD programme 16% reported the same afterwards. The number

of respondents reporting no units of work with ICT activities dropped from 23% to 8%. The implication is that nearly all respondents (92%) are now using ICT in at least one unit of work. Again reports from some schools suggest this level of use is mandated through inclusion in performance appraisal goals.

Participants were next asked to identify the subject, or learning area, in which they most used ICT with students, the software they used and the lesson activity/topic in which it was used. Their responses were coded as accurately as possible. However, many of the responses regarding the type of activity were difficult to code as they lacked specificity.

Curriculum Area

Ten respondents listed more than one subject when asked what subject or learning areas they had used ICT with students the most in. A total of 40 subjects were listed ranging from vocational subjects such as construction, hospitality and clothing through to the core academic subjects of English, Maths, Science and Social Studies.

Table 4.4 Subjects in which ICT is used the most with students

Subject	Number of mentions	% of total mentions
English	37	13
Mathematics	36	13
Science	31	11
Social Studies	27	10
Maori	15	5
Computer Studies	14	5
Physical Education	13	5
Graphics	9	3
Health	8	3
Art	7	3
Biology	7	3
Home Economics	6	2
Technology	6	2
History	5	2
Music	5	2
Accounting	4	1
Drama	4	1
French	4	1
Geography	4	1
Physics	4	1
Economics	3	1
Special Needs	3	1
Tourism	3	1
Business Studies	2	1
Film Studies	2	1
Super Studies	2	1
Agriculture	1	0
Assessment	1	0
Clothing	1	0
Construction	1	0
Dance	1	0
Electronics	1	0
Fashion Design	1	0
Food technology	1	0
Forestry	1	0
Hospitality	1	0
Language	1	0
Retail	1	0
Vocational Studies	1	0
Webquests	1	0
Total	**275**	

As Table 4.4 shows, ICT is predominantly used in these core subjects with nearly half of all responses coming from this superordinate category (47%). Usage in these core areas is relatively consistent. This is probably largely due to the fact that there would be more participants teaching in these subject areas. These are also subjects taught at Years 9 and 10 where ICT use is often greatest. Maori also features highly, being ranked fifth behind the core subjects and, interestingly, above Computer Studies.

Software Used

As Table 4.5 shows, the software used most predominantly were the applications in the Office Suite (Word, Excel, PowerPoint and Publisher). These were followed by Internet browsers. These are the most readily available applications. It would appear from these results that teachers are not venturing far from generic uses of the computer or uses that involve basic skills taught in most workshops. Only 7% of responses were coded within multimedia (involving the use of digital and video cameras). The remaining six categories accounted for only 10% of responses and included:

- *placing material on the Internet using HTML*
- *using Applets for demonstration*
- *using the data show.*

Table 4.5 Number of respondents using software/tools with their students in class

Software/Tools	Number of responses	Percentage of total responses
Office	143	49
Internet	98	34
Multimedia	20	7
CD	12	4
Web	7	2
Database	4	1
Applets	3	1
Data show	3	1
Other	2	1
Total	**292**	

Activities Undertaken

Respondents' descriptions of the types of activities undertaken were often vague and it was difficult to determine exactly what they meant when coding, hence the "unclear" code was used to indicate that it was not clear either who was using the computer or for what purpose. Table 4.6 shows the results of the coding of these data.

Table 4.6 Types of activity most commonly undertaken when using computers with students

Activity	Number of mentions	Percentage of total number of mentions
Student work	85	29
Research	85	29
Student presentation	38	13
Lesson presentation	35	12
Lesson preparation	29	10
Administration	10	3
Unclear	8	3
Webquests	1	0

The two most frequent codes used were student work and research. Student work was a composite category including any work done by students on computers that was not specifically research or the presentation of work. It included activities such as worksheets, using specific software (Crocodile Clips, CAD, Java Applets, spreadsheets, Te Ao, MIDI, Computer-Assisted Stats

Teaching, Anatomica to name a few), designing web pages and report writing for project work. When one considers the composite nature of the student work category, research, is actually the most frequent activity undertaken by students when using ICT. This is certainly reinforced from a consideration of the ICT Cluster Reports and the school Milestones. The third category is student presentation of work. This category included items such as PowerPoint presentations and the presentation of research information in unspecified ways. It did not include items such as writing a magazine or designing a brochure that are outcomes in themselves rather than the presenting of work completed. Some schools, such as Kerikeri, were able to document in their Milestones the actual increase in student use hours throughout 2002 and 2003.

Some of the more interesting activities described included:

- *taking pictures of the work as they go through different stages*
- *the visualisation of complex ideas*
- *freezing drama frames for identification*
- *creating sound effects, making music for plays and editing sound for plays.*

A further level of coding of the student work category showed that the most common activities were subject specific work, which included items such as using language software or websites, design work for technology subjects and tessellations in mathematics (Table 4.7).

Table 4.7 Types of activities within student work

Activity	No. of codes	% of total No. of codes
Subject work	37	27
Writing	21	15
Data analysis and reporting	14	10
Projects	14	10
Worksheets	12	9
Graphing exercises	10	7
Publishing	8	6
Activities	5	4
Assignments	5	4
Computer skills	5	4
Assessment tasks	4	3
External link	1	1
Animation	1	1

The next most common activity was writing (15%), which included those responses where writing was the outcome rather than word processing other work. Such responses were predominantly from English teachers and included creative and transactional writing. Data analysis and reporting, along with projects, was the third ranked category (10% each). The first of these suggested experimental or research based work involving the collection of data, its analysis and the completion of written reports. The items included in projects were often not specific and simply stated "projects", which implies a large piece of work completed over a period of time. Specifically mentioned in this category was the Science Fair.

These first four categories account for nearly two-thirds of all codes (62%), which suggests a consistency in terms of the type of activities being undertaken. While a range of activities were mentioned few were really significant in terms of the total number of activities. There is little to

suggest a major shift in pedagogies or a move away from the more traditional activities such as worksheets and content delivery or skill development.

Within the section related to student use, teachers were asked to indicate the frequency of student engagement in a number of activities before and after the ICTPD programme. The scale used was 1 = never, 2 = one or two times a year, 3 = one or two times a term, 4 = one or two times a week and 5 = daily/almost daily. Table 4.8 shows the mean levels of frequency for these activities.

Table 4.8 Mean levels of frequency of student engagement

	Mean		
	Before	**Now**	**Difference**
Accessing or searching for information on the Internet	2.47	3.23	0.76
Accessing or searching for information on electronic encyclopaedias	1.74	2.34	0.60
Composing, editing and presenting 'project' or content based work using word processors and/or graphics	2.42	2.93	0.51
Composing, editing, presenting creative work using word processors and/or graphics	2.52	3.02	0.50
Presenting their learning in the form of computerised slide shows	1.57	1.98	0.41
Working through content or concept simulations on computer	1.33	1.73	0.40
Emailing other students or experts about a current topic or problem	1.66	2.05	0.39
Learning from a computer based tutoring programme	1.30	1.68	0.38
Using the electronic catalogue to find appropriate reading in the library	1.76	2.13	0.37
Recording, calculating or analysing data using prepared spreadsheets	1.51	1.86	0.35
Faxing or phoning other students, experts etc about a current topic or problem	1.34	1.57	0.23
Editing and composing multimedia presentations or videos using computer software (i.e. including sound and moving images)	1.24	1.44	0.20
Practising skills or reinforcing knowledge using content specific drill and practice programmes	1.51	1.71	0.20
Designing or developing their own databases or spreadsheets information	1.38	1.55	0.17
Designing and/or creating web pages to present learning	1.22	1.38	0.16
Data logging using external monitoring devices connected to a computer	1.14	1.22	0.08
Writing computer programs or scripting interactive presentations	1.11	1.15	0.04
Overall	**1.60**	**1.94**	**0.34**

Increases in the mean levels of frequency of engagement for students overall did not change substantially remaining between "never" and "one or two times a year". The areas where there was the most improvement involved the access of information, reflecting the focus on research discussed earlier. These were followed by the presentation of student work. These results are probably a reflection of the reportedly generic nature of many ICTPD workshops that tended to focus on Office Suite applications rather than subject specific software.

Both before and after the ICTPD the four most frequent ways in which students were engaged remained constant. Two of these involved accessing information either on the Internet or on electronic encyclopaedias and presenting work using word processors and or graphics. The implication is that there has been no change in the way in which students are engaging with ICT in

the classroom as a result of the ICTPD programme. Rather it appears to have strengthened the way in which participants were already using computers.

Two findings suggest that the impact of ICTPD has not reached the core activities of teaching and learning but occurred within those professional activities surrounding classroom practice. Firstly, the mean levels of frequency for student engagement are low with only two types of use exceeding 3 (one or two times a term) even after ICTPD. Secondly, the extent of change in level of student engagement was less than for use in preparation, planning and administration. It is not surprising that the ICTPD had not reached the core activities of teaching and learning, given the nature of the professional development described as taking place. As Wood (2003) notes, "The knowledge base that teachers need to construct in order to support learners and to integrate their uses of ICT into the curriculum and alongside their other learning and teaching activities has, to date, been grossly underestimated and seldom researched" (p. 16).

THE STUDENT VOICE

Focus groups, comprised of a range of students, were interviewed at three of the schools regarding both the use of ICT in their classrooms generally and their awareness of FarNet. The range of responses both within and across groups varied greatly, reflecting the widely diverse levels of use of ICT and FarNet.

The first group was a diverse group of Year 8 students (n = 7) with varying levels of confidence and ability to articulate their thoughts. This particular group had worked extensively on a FarNet project called "The Sandwich Press". This was an online magazine they had created in their own time. The students were all highly enthusiastic about the project and believed they had learned a lot from being part of it. They felt they had not just developed ICT skills but had also developed their writing and publishing skills in areas such as how to appeal to an audience and how to design layouts. They had also learned about organisation and the need to meet deadlines and work together. They were excited about seeing their work online and felt that it would be good to get other schools involved as their students "*might know different things*". They were also very positive about the use of ICT in the classroom, believing that they not only learned better but also learned different things. As a group these students were very aware of what computers could offer. When asked what they would do if they were responsible for teaching the class for a week their responses included ideas such as playing music while the students worked and doing "*meaningful projects*" where the students "*learn to explore in depth*".

A second small group of Year 10 students, at the same school, was also enthusiastic about the use of computers in the classroom. They had created a series of PowerPoint presentations on their school for the principal to use at a conference. Both the teachers and the students were very proud of their work. These students were highly knowledgeable about the processes they had undertaken to complete the project and were able to articulate their experiences. Their teacher was obviously not as skilled as they were but had been able to facilitate their use of ICT. This teacher expressed her belief that ICT had real potential as a learning tool.

The third group of students was a large and diverse group comprised of students from Years 9 to13. On the whole this group was not impressed by the FarNet website. They had looked at it and found it boring, lacking in interactivity and hard to navigate. They felt it needed "*things on it that help with assignments*" and a master site for subject areas. Their use of ICT in the classroom appeared to vary greatly by year level and subject area, ranging from all the time to not very often. Students were aware of the school intranet and stated that all subjects had their own sites, which included

year planning and links to other sites. Some students described being able to access their work from home and emailing work to teachers. Others mentioned widespread use in science, including simulating experiments that they would otherwise not experience for safety reasons. The Year 13 students felt that things had really changed since they were in the Junior classes with much more use of ICT now, particularly webquests, which they had never done. For most of these students the use of computers increased their motivation and interest. However, this was not the case for all students and there were some who did not like using computers in the classroom. One student explained the varying levels of use in different subject areas as being related to teacher attitude. It was his belief that some teachers did not like computers because "*they lose control ... lose power ... they need to know what the students are doing*". As with the Sandwich Press group these students were very aware of their learning and the different styles of teaching they experienced. One student described a teacher who used computers a lot as "*teaching differently*". Another explained how there were "*three ways to learn*" and it is "*bad if a teacher can only teach one way*".

A group of Year 12 students, from a low academic ability grouping, reported quite extensive use of computers both in English and Tourism. They primarily completed research projects on areas ranging from Barbie to drugs. They had also designed dust covers for books as part of their novel study in English. They saw advantages to using computers in that they were more up to date than books, they were faster, and their presentation was improved. One student also commented that it was easier to cheat and computers were a welcome distraction.

The final group of students varied in their comments regarding ICT. Some were able to describe using ICT in areas such as Social Studies, German, Technology and Biology. Others had used Success Maker software for language enrichment as a small group withdrawal programme. The main areas of use appear to be Social Studies for junior classes and Biology for senior. The seniors had researched the impact of human activity on the ecosystem and presented their reports with graphs. Much of the reported use appears to have been teacher directed with a student suggesting that teachers gave them the questions to research. The level of use varied greatly, depending on the individual teacher and subject. These students did use computers at home for research and chatting. They perceived the computer as providing more information than the library. Those who had had limited experience of computers in the classroom suggested it was due to teacher concerns about classroom management. They admitted to being louder and less well behaved when in the computer lab due to the distractions offered. Interestingly, when presented with the scenario that we would take the computers away unless convinced otherwise, they could not think of good reasons for retaining computers at school.

SUMMARY

In this section some key ideas arising from the data were:

1. Teachers reported a generally higher level of use of the Internet than of FarNet. For the Internet, accessing resources for teaching and the NCEA and TKI sites were dominant uses and over 60% thought the material very useful.
2. The use of ICT for planning, preparation and administration increased markedly over the period of the ICTPD contract, partly as a result of mandated practices by schools.
3. Less marked was the reported perceived effect on teaching of incorporating ICT into units of work. Although respondents reported increases, for example in the student centred nature of their teaching, not more than 10% ever reported a marked change.

4. There was a reported increase of extent of incorporation of ICT into units of work. Nearly all respondents now report using ICT in at least one unit of work with use predominant in the core subject areas and applications software the most commonly mentioned. Only two types of student use were reported to occur more than one or two times a term (accessing information on Internet, composing, editing and presenting creative work).
5. With respect to overall impact on their professional lives, just over half of the teachers report none or little.
6. Students reported widely varying levels and types of use of ICT in classroom practices. These variations were attributed primarily to different teaching styles and teacher attitudes to ICT and teaching.

Section 5: Impact on student outcomes

In the FarNet Milestone reporting template for each school was a section for the school to present "comparative longitudinal assessment data in major learning areas, for example, maths and science, to identify results of the programme". This requirement clearly reflected the view of the initial instigators of the project of likely sources of evidence for potential outcomes of FarNet. However, in light of the discussion in Section 1 such a view of outcomes, decontextualised from ICT practice in these areas, could be seen as unlikely to yield useful information.

The Becta studies (British Educational Communications and Technology Agency, 2001; Cox et al., 2003a) conclude that there is "substantial" evidence of positive effects of ICT use, particularly in the core subjects of English, Maths and Science, the focus areas for FarNet. However, as pointed out earlier, for this effect to occur a number of conditions are needed, including specific use related to learning objectives, integrated use and the use of measures where assessment is designed to relate to particular types of learning experiences promoted by the use of ICT.

Many schools left blank the section in the Milestone Report relating to outcomes. There was a note in an Okaihau Milestone (March 2002) that the Principal's Forum would consider how to prepare this comparative, longitudinal assessment data in a consistent and systematic way, then report in September 2002. This did not appear to happen. It is telling that schools mostly used the section where they were supposed to present the comparative longitudinal assessment data simply to describe the applications they were using with students. However, this was not specific use as it related to learning objectives. One or two schools included teacher report data, namely, teacher ratings of whether aspects of FarNet had increased student learning (It appears that high speed Internet access did, as it was rated highest!).

It is debatable, given the findings from other research (Clinton & Ward, 2002; Robinson, Phillips, & Timperley, 2002; Timperley, Parr, & Higginson, 2003), that schools possessed the capacity to collect and interpret evidence, let alone design measures that tapped the particular learning objectives that the use of ICT was associated with. There is a further suggestion that to do this may require some shifts in beliefs about the value of such evidence (Annan, Lai, & Robinson, 2003; Timperley & Parr, in press). Given that the schools themselves did not appear to collect achievement information more related to the learning outcomes of which ICT is an integral part, the task of determining outcomes with respect to student achievement becomes a difficult one. We were faced, therefore, with the necessity of using proxy measures. These measures included national achievement data, which was unlikely to yield results; school roll data as an indicator of retention (equally problematic) and teacher report on perceived impact.

At interview three principals were asked what ICT offered their school and then what evidence they had of the impact of ICT in their school. In the course of their interviews, several of the curriculum leaders and ICTPD co-ordinators also made comments related to changes in teaching and learning. The common thread to the responses concerned enhancing learning. This was seen to occur through increasing the element of choice for students in learning; through increased resources both in terms of access and in terms of allowing more individualised programmes for students, and through providing a more engaging form of learning, particularly through the multimedia aspect. For one principal, another aspect of enhanced learning was the possibility of more powerful, constructivist type learning; another described the fact that students could "*get further, get challenges out of it*".

However, in response to the question regarding evidence that ICT was having an impact, answers focused on teachers, with very few references to student achievement outcomes. Consequently, faced with a compelling research question that asked about outcomes for students, and no achievement data forthcoming from school sources, we have turned to official data from national qualifications.

We have analysed the school roll data for 2000–2003 to look for trends with respect to retention of students into senior levels. We have analysed NZQA data for Years 11, 12 and 13, paying particular attention to the target areas of Maths, Science and Technology and considering both the numbers of candidates presenting and achievement over time. This seemingly straightforward task is, in reality, one of considerable complexity, particularly given that FarNet operated during a period of transition with respect to qualification systems. Again it needs to be stated that any trends in the data may not be attributable to FarNet as there were several interventions running concurrently in the schools in the Far North.

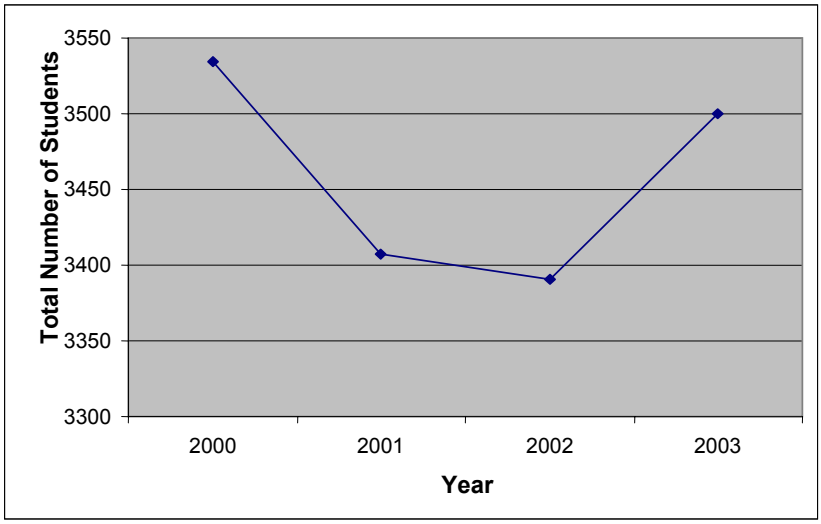
SCHOOL ROLL

One of the motivating factors behind the implementation of FarNet was to improve retention rates for senior students at the schools concerned. It was perceived that falling rolls in many of the schools have been exacerbated by a loss of senior students, either through dropping out of schooling or shifting to Auckland schools. One of the key proponents of the FarNet project felt that through increased competition among students to achieve top grades, across all the schools, in key subject areas and the sharing of resources and ideas, students would stay in the North to complete their schooling.

However, totalling the losses and gains across all the FarNet schools shows that in 2003 there were only 34 fewer students than in 2000. This suggests that any losses have mainly been to schools within the area. This view was supported by interviewees who commented on seeing previous students at other schools. The comment was also made that they "*moved to the beach in the summer and inland in the winter*".

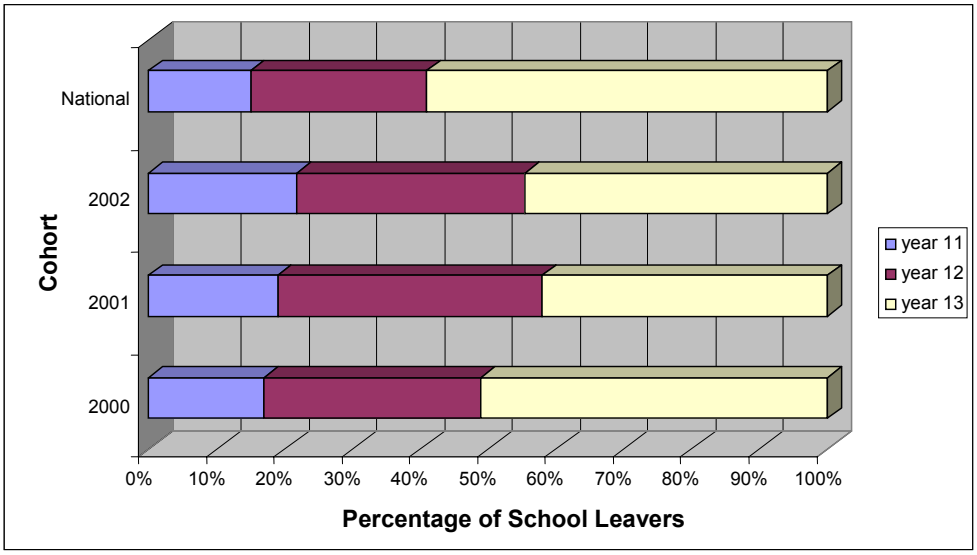
Figure 5.1 shows that while the overall roll in the FarNet schools steadily declined between 2000 and 2002 there was a marked upturn in 2003. The reasons for this are difficult to determine. It may be merely part of a national upturn in secondary student numbers. Or it may be, as senior management and teachers suggest, that population cycles in the North are closely linked to the overall economy. One interviewee suggested that people moved back to the North as "*refugees from the city*" when the economy in Auckland was poor. It was also mentioned that there were now more jobs in the area with the building of the new prison and a Warehouse opening in Kerikeri. These findings suggest a transient population not only between the North and Auckland but also within the North. It is therefore difficult to ascertain the impact of individual programmes supported by technology on student retention.

Figure 5.1 Total number of students in FarNet schools 2000–2003



Retention of students through to Year 13 was one of the aims of FarNet. As Figure 5.2 shows, this aim has not been met significantly, although there was a slight improvement over all FarNet schools in terms of retention to Year 13 between 2001 and 2002. There was, however, a continuous increase in the percentage of students leaving at Year 11 between 2000 and 2002. It must be noted, however, that variations between schools were great in terms of retention.

Figure 5.2 Percentage of school leavers at each year level across Far North for 2000, 2001, 2002 compared to national average for 2002



RESULTS FROM NATIONAL QUALIFICATIONS 2001–2003

Unfortunately, the period of FarNet coincided with the transition period from School Certificate, Sixth Form Certificate and University Bursary to the National Qualifications Framework including Unit Standards and NCEA. The resultant complexity of the qualifications framework, illustrated in Table 5.1, has made it difficult to study trends in student achievement across these years.

Table 5.1 Qualifications available to students by Year level

	2001	2002	2003
Year 11	School Certificate	NCEA level 1 Unit Standards	NCEA level 1 Unit Standards
Year 12	Sixth Form Certificate Unit Standards	Sixth Form Certificate Unit Standards	NCEA level 2 Unit Standards
Year 13	University Bursary Unit Standards	University Bursary Unit Standards	University Bursary Unit Standards

Even where a qualification has been offered for more than one year (Sixth Form Certificate and Bursary) any analysis of trends is complicated by the availability of Unit Standards that appear to have been increasingly offered and used at each of the schools. Unit Standards offer a much wider range of subjects than the traditional Bursary, or Sixth Form Certificate subjects, and these may be more attractive to many of the students in the Far North with their focus on vocational qualifications. In 2003 Unit Standards were 40% of all NZQA standards offered to students and even in 2002 there were over 35,000 results for Unit Standards for these schools, although senior students could still sit Sixth Form Certificate and University Bursary.

Given the higher level of activity on the Maori and Biology curriculum pages on FarNet, these subjects have been analysed separately where possible to see if there is any additional improvement in candidate numbers or pass rates compared to other subjects where there was less activity.

Bursary

The number of candidates in the subject areas focused on in the FarNet project was analysed over the period 2001 to 2003. Table 5.2 shows the percentage change in candidates in each subject as a percentage of total school roll for Year 13 between 2003 and 2001.

Table 5.2 Percentage change in number of University Bursary candidates in subject areas as a percentage of school roll for Year 13

	Biology	Calculus	Chemistry	Design	English	Maori	Physics	Statistics
School A	-28	2	4	-6	-14	0	14	-5
School B	0	0	0	0	0	-100	0	0
School C	25	0	-8	0	0	67	-8	0
School D	11	-5	3	-1	-30	-3	-11	-32
School E	-10	9	-5	0	-12	-2	-2	-4
School F	9	4	10	14	7	-3	5	4
School G	7	-4	14	-2	-12	7	-5	3
School H	0	0	0	0	67	-50	0	0
School I	0	0	0	-29	0	100	0	0
School J	-13	-26	-9	-7	-11	3	-25	-46

The only school to show consistent increases in the number of Bursary candidates across a range of subjects was School F. In many of the other schools there have been decreases across all subjects but, as mentioned earlier, this could be a result of the availability of Unit Standards and a belief in these schools that these, often more vocational qualifications better meet the needs of their students. It could also be that while schools retain more students, there are more who are not willing, or able, to enter for national qualifications, perhaps leaving school before these are undertaken.

Considering the achievement results across all the FarNet schools shows a relatively constant pass rate in these subjects. In 2001 82% of all students gained an A, B or C pass. The figure was 85% for 2002 and 80% for 2003.

A consideration of the percentage of the total Year 13 roll achieving an A, B or C in Bursary in Te Reo during 2001–2003 shows mixed results with some schools showing marked improvement and others showing a decline. The impact of Unit Standards is apparent in that three schools did not have any Bursary candidates in this subject beyond 2001, although they did enter Unit Standards (see later sections). Interestingly, one school only entered Bursary candidates for the first time in 2003. This may reflect the abilities or needs of students that year. Teachers reported a tendency to move between Unit Standards and more traditional qualifications depending on the composition of the student body. Analysing the equivalent data for Biology shows a similar pattern. Again, some schools have not offered Biology Bursary at all. Results were also mixed with some schools showing a decrease in passes and three showing marked increases.

Sixth Form Certificate

As with Bursary, the data are complicated by the option of Unit Standards and it would seem that many schools offered these in preference to Sixth Form Certificate (SFC) in many subject areas. The senior management interviewed all commented that many of the schools in the Far North had moved into Unit Standards very quickly. The Far North schools had been part of a pilot programme called Gateway that aimed to get students vocational qualifications. The large number of standards presented over this time period would seem to corroborate this. In fact, two schools do not appear to have offered any SFC subjects, preferring to concentrate on Unit Standards while a third offered SFC in English only.

Table 5.3 displays the percentage change from 2001–2002 of candidates for SFC as a percentage of the school roll for Year 12. The overall trend appears to have been an increase in the number of candidates for SFC.

Table 5.3 Percentage change in candidates for 2001/2002 for SFC as a percentage of school roll for Year 12

	Bio	Chem	English	Maori	Maths Applied	Maths	Physics
School A	–	–	–	–	–	–	–
School B	–	–	–4	–	–	–	–
School C	-12	-18	-5	-8	–	-25	2
School D	7	3	4	3	–	2	3
School E	19	14	-14	–	–	4	-4
School F	3	12	14	3	-6	–	–
School G	4	-2	4	-5	0	-2	–
School H	–	–	44	–	–	–	–
School I	–	–	–	–	–	–	–
School J	4	5	6	15	-	11	12

Note: Means there were no entries over the two years.

National Qualifications Framework 2002/2003

Results on the National Qualifications Framework include both Achievement Standards and Unit Standards. Overall, more students gained results on the framework in 2003 than 2002. This is to be expected given that Sixth Form Certificate was no longer available in 2003. For most schools more students were entered than there were results for, suggesting students may have left prior to completing Unit Standards entered for. However, the large number of increases in entries does suggest an improvement in the number of students completing individual standards overall.

Results across all the FarNet schools show a 9% increase in the number of students passing individual standards between 2002 and 2003. However, the level of change varied between schools, with four schools showing an increase of 20% or greater. It should be noted that the small roll sizes of some schools may make their results appear more marked. Results for Te Reo over this period are very positive with 287 more results in 2001 than 2002 and a 10% increase in pass rates over the same period.

EFFECT ON STUDENT LEARNING OF INCORPORATING ICT BASED ACTIVITIES INTO CLASSES

Finally, in terms of the effect of using ICT in teaching and learning, participants in the ICTPD survey of September 2003 were asked to indicate the effect on student learning of using ICT in the classroom. Again, a range of areas that may have been affected was offered. These were variation of learning experiences, skills and abilities of students, student achievement in formal assessments, amount of student creativity, amount of higher order thinking and student motivation.

ICT does appear to have had an impact on the extent to which learning experiences are perceived to be more varied, with 74% of teachers responding to the survey stating that they felt student learning experiences were now more varied. A further 17% felt that they were now much more varied. Only 8% felt there had been no change. A similar level of impact was reported in terms of the range of skills and abilities students learn or demonstrate, with 71% stating that these were now increased and 11% stating that they were greatly increased. Student motivation was perceived to have increased according to 58% of all participants while 42% felt there had been no change.

In terms of the type of learning students demonstrate, 53% of teachers believe that students are more creative, 43% believe that achievement in formal assessments has improved and 38% believe that students demonstrate higher order thinking more frequently. In all these categories very few participants believe that any of these has reduced, with the rest predominantly stating that ICT has had no impact. Results on the National Qualifications Framework would appear to support the view of most participants that there has been no improvement in formal achievement.

Participants were also asked whether there were any other ways that ICT had affected student learning. Comments made included an increase in student motivation, better presentation of work and improved learning. The following is a sample of responses from the 25 given for this question:

- *If you use it as a tool for learning rather than the reason for learning the students appreciate the variety it brings to class.*
- *I feel my students are not receiving the full benefits of ICT solely because of my inadequate understanding.*
- *Peer tutoring increased – assisted students who have poor writing/art etc. Attention increase.*

- *Much more motivated and enthusiastic confidence with skill building instant results – good esteem builder.*

It appears from these findings that the inclusion of ICT is perceived to be either neutral or to improve the experience of learning. The level of use and the type of activity must determine to some extent whether there is an impact or not.

SUMMARY

Key points from this section are:

1. Both individual school rolls, and the overall numbers of students in the Far North fluctuated over the period 2000–2003. However, after initially dropping the overall numbers had almost reached the level of 2000 in 2003 with only 34 fewer students. It is difficult to determine reasons for these fluctuations. Two possible explanations are cyclical movement between Auckland and the North dependent on economic conditions and movement around the North.
2. As with overall roll numbers there also appears to have been a reversal of an earlier trend in that the number of students remaining to Year 13 improved between 2001 and 2002, although not to the same level as the national average. As with Point 1, the number of external factors possibly impacting on these numbers makes it impossible to isolate the impact of FarNet on retention of students.
3. It is difficult to compare national qualifications data due to the transition between qualification systems. However, there was a 9% increase across the Far North in pass rates for individual standards (achievement or unit) between 2000 and 2003.
4. Many schools are offering a wide range of Unit Standards with a vocational focus, such as tourism and forestry. They feel that these meet the needs of their students better than the more academically focused achievement standards.
5. Respondents to the final ICTPD survey report a predominantly positive impact on student learning through the inclusion of ICT. While only 43% believe that achievement in formal qualifications has improved, 53% report more creativity and 58% believe that students are more motivated. The variety of material and the range of skills that students display are also perceived as being improved by the majority of respondents (74% and 71%, respectively).

Section 6: Conclusions

Five main themes emerge from this evaluation that need subsequently to be considered in more depth and which have the potential to impact on future projects such as this. These are:

1. The need for shared understandings of what the project is, what the desired outcomes are and how these will benefit teaching and learning.
2. Access to infrastructure does have an impact on both teacher skill and confidence.
3. Any professional development offered must move beyond simple "one size fits all" workshops primarily designed for skills enhancement. There is a clear need for a strong pedagogical content and for continuous professional learning to occur.
4. The creation of a professional learning community is a complex process and a number of factors need to be present before such a community will thrive. While ICT has the potential to facilitate ongoing professional learning and communication, many of the implementation issues, of a professional learning community, are compounded when the community is online.
5. A number of factors mean that it is virtually impossible to determine the level of impact such projects have on teaching and learning without sophisticated evaluation methodologies that are still being developed.

The need for shared understandings

While the majority of teachers were aware of FarNet and had been to the website at least once, a clear understanding of precisely what FarNet was meant to be (a professional learning community) or what their roles and responsibilities were in terms of the community do not appear to have been shared. That is, for most teachers, FarNet was something they could access if they wanted to, not something they had a responsibility to contribute to actively and therefore ensure its success. While the majority reported visiting and using material from the site, many visited only once and found the material only moderately useful hence reducing return visits.

Many were not willing to participate until they could see value in doing so and, perhaps more importantly, until they were confident that the community would survive. The irony is of course that without their ongoing involvement the community could not be fully implemented, let alone sustained. In many instances even the curriculum leaders were unaware of precisely what their role entailed, seeing it more as an administrative task than as the facilitation and leadership of a community aimed at enhancing teaching and learning.

The "big picture" goals of FarNet appear to have become "lost" in the more specific goals of improving infrastructure and providing professional development at a school level. Closer synergies were needed between the goals of FarNet and the goals of the ICTPD contract if the idea of a professional learning community impacting on teacher practices was to be achieved. It may also be that the vision of FarNet needed to become part of the vision of each school so that all professional activities within the school were aligned with the practices and activities of FarNet. Such congruence would have provided teachers with a better understanding of what FarNet could offer them in their immediate teaching context.

The reality is that instead FarNet appears to have become a solution looking for a relevant problem. Teachers tend to focus on the problems confronting them in their immediate context; that is, they respond to what is happening in the present. Unless FarNet could offer instant, acceptable solutions to these problems it was likely to remain peripheral to their daily experiences. The issues FarNet was to resolve, such as teacher isolation and improved professional learning, do not appear to have been pressing issues for most teachers. Given that teachers have traditionally worked in relative isolation even in their own schools it may be that this is not seen as a problem.

Access

One of the areas where FarNet has been seen as successful is in improving access for teachers to technology. This improved access has been enhanced by the Laptops for Teachers scheme. Increased access appears to have led to increased confidence and skill in the use of technology primarily, it would seem, through familiarity and increased use.

However, the increase in technology has not been without technical difficulties. In some cases the new technology did not integrate successfully with what schools already had and the resultant technical issues would have impacted negatively on use. For teachers the reliability of equipment and the presence of technical support are important constraints on use.

Professional Development

The focus of the professional development provided through the ICTPD contract appears to have been largely skills based and undertaken in what are often one size fits all workshops. While such transmission based professional development will enhance teacher skills and confidence, it is not likely to lead to a change in teaching practices, nor will it meet the needs of all teachers. Professional development related to FarNet directly also appears to have been limited and often involved getting teachers up to speed in basic skills, albeit different skills like website accessing and posting. Apart from one school, there appears to have been little pedagogical content in the professional development programmes.

It is difficult to determine, however, exactly what professional learning these teachers have participated in. Their definition of professional development appears to be limited to the types of workshops described above. Interview material would suggest that other, more informal forms of professional learning do occur within these schools on a 'just-in-time' basis. Whether these lead to any change in practice, however, is debatable. What is clear from the literature is that more than one kind of professional learning is required to meet the varying needs of teachers and that this must include a pedagogical component.

Professional Learning Communities

As our carts and horses analogy suggests, a number of pre-existing conditions are needed before a professional learning community can be implemented, let alone be sustained. These include a strong sense of collective responsibility for the greater community and the existence of a "safe" environment in which to not only share resources and ideas but also in which to take risks. Such an environment may take the form of an existing community as illustrated by the Maori teachers' community in this project.

Within the FarNet community there appears to have been no sense of any collective responsibility apart from within the Maori teaching community. For the teachers concerned their prime responsibility appears to have been to the students in their classrooms.

With respect to the notion of sharing with others aspects of practice in the form of resources, a common response was "What is in it for me?" That is, they were reluctant to participate unless they got something back. There was also a sense of insecurity expressed by some about sharing in an unknown environment, an uncertainty perhaps about being "judged" by others. As a result, few resources were posted by other than curriculum leaders and, because this was the main yardstick of success for them, the latter felt that their communities were largely unsuccessful.

A deprivatising of practice and the development of a sense of collective responsibility requires teachers to feel safe and non-threatened. Feelings of security are less likely to be present in an online community where participants are not all well known to one another and where the norms of communication such as instant feedback are not present.

Paradoxically, an online community does allow for a number of core factors for professional learning, such as ready communication between members, the easy sharing of resources and a much wider community of practice. It also allows for continuous professional learning in that material is always available and discussion groups can be accessed asynchronously. It is important to note, though, that listservs and professional reading were unpopular forms of professional development!

Impact

One of the issues with evaluating FarNet was the lack of a clear delineation between it and a number of other projects happening at the same time. Data collected from interviews makes it clear that for many teachers FarNet, the ICTPD contract and Laptops for Teachers all came under an umbrella of ICT "stuff" and that they would not be aware of where precisely equipment or professional development was being sourced from.

The use of ICT for planning, preparation and administration has increased markedly. However, the impact on teaching practices has been less marked. Although teachers report increased use of ICT in the classroom it remains limited both in nature and extent. Only two types of student use were reported to occur more than one or two times a term. The fact that the resources posted were largely electronic versions of worksheets further suggests that there has in fact been little change to the nature of teacher practice.

When considering the impact on learning, a problematic issue is the difficulty of ascribing educational outcomes to any one factor such as ICT. Without sophisticated statistical analysis and methodologies one cannot categorically state that any improvements in outcomes are due to one programme such as FarNet, particularly when one considers the number of teaching and learning initiatives occurring in the Far North schools.

Compounding these issues is the fact that it may be that the benefits to learning from the introduction of ICT are not measured by traditional assessments. Until we have assessment tools that determine the extent to which outcomes such as higher order thinking and critical analysis have been enhanced it is impossible to accurately ascertain the impact of ICT.

Finally, the timeframes for such evaluations are often too short to see any real change in teaching practices or learning. The implementation of new programmes has a much longer lead in time than is often allowed for. For many of the FarNet schools the equipment was not actually functional until a year into the contract. Similarly, the time needed for teachers to learn about and then adopt new practices and to become confident users of new tools is often much longer than that envisaged when the extent of funding is determined. The reality is that in a two to three year time period it

may be that success can be judged only on how well the initial implementation has been undertaken and the groundwork laid for ongoing development. In the case of FarNet, a central issue in the long term sustainability of the concept was that there had to be a groundswell of teacher support for the notion of, and need for, a professional community. When professional learning communities address acknowledged needs and are functioning well, such communities are self-sustaining and continuously evolve to meet the needs of members.

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