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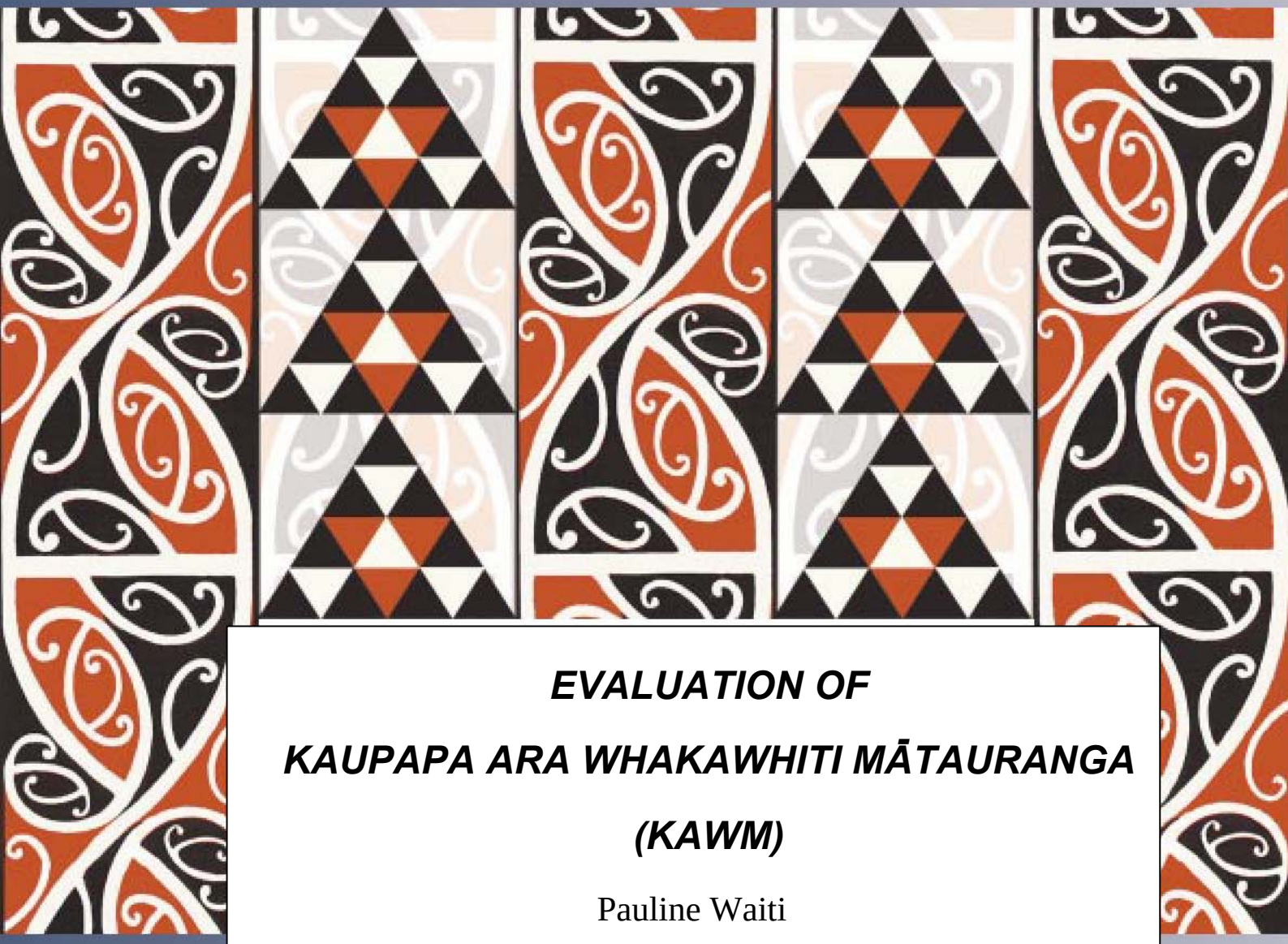

EVALUATION OF KAUPAPA ARA WHAKAWHITI MĀTAURANGA (KAWM)

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NEW ZEALAND COUNCIL FOR EDUCATIONAL RESEARCH

TE RŪNANGA O AOTEAROA MŌ TE RANGAHAU I TE MĀTAURANGA

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Executive Summary

Background

Kaupapa Ara Whakawhiti Mātauranga (KAWM) encompassed a number of school improvement initiatives and aimed to:

- improve student achievement;
- improve school performance;
- strengthen school and community relationships;
- upgrade school ICT infrastructure; and
- improve teachers' professional capability through ICT.

There were five school clusters within the umbrella of KAWM, and the strategies used to achieve the aims of KAWM were specific to the respective clusters involved. This evaluation focused on four of the five clusters.

1. The wharekura cluster participated in all four aspects of KAWM. They received video conference kits with technical support, training for the wharekura e-teachers, laptops and professional development for their teachers, and school-based ICT infrastructure.

2. The Paerangi schools' cluster participated in three aspects of KAWM and received the video conference kits with technical support, laptops and professional development for teachers, and school-based ICT infrastructure.

3. The Wairoa schools' cluster and Kiwa (Gisborne) cluster participated in one aspect of KAWM only and received thin client networks with high-speed network connections and technical and learning facilitation support. This aspect, school-based ICT infrastructure, is called Project Rorohiko for the Wairoa and Kiwa clusters.

NZCER was contracted by the Ministry of Education to undertake an evaluation of the KAWM initiatives during 2002–03.

The key questions guiding this research were:

1. What use is actually being made of each of these four aspects of KAWM? What factors lie behind any differences in use?

2. What are the relationships between the uses being made of these three ICT tools, and the Wharekura Expert Teachers' initiative, and wharekura and school curriculum organisation and content, teaching approaches, learning, student interest, teacher interest, motivation, retention, professional support and development, inter-school collaboration, school management, and community involvement and support for wharekura and schools?

3. What are the conditions, skills, learning, and resources which allow the best use of KAWM, and, conversely, what are the conditions, skills, type and amount of learning, and resources, which inhibit its use, or which raise questions about its sustainability?

4. What are the implications or lessons to be drawn from the initial implementation and use of KAWM for other policies and initiatives?

In 2002 and again in 2003 interviews with principals and teachers were undertaken in a total of six wharekura, three Paerangi schools, seven schools in the Kiwa cluster, and six in the Wairoa cluster. Twelve video conferencing classes and 59 ICT-related classes were observed. The findings from the first round of fieldwork in 2002 were reported in June 2003. This report draws on the findings of the fieldwork from both 2002 and 2003.

Summary of main findings in relation to the research questions

Use of the four aspects of KAWM

The online classrooms and Wharekura Expert Teachers' initiative

The wharekura and Paerangi Māori boarding schools decided to participate in the KAWM project to provide their senior students with a wider curriculum and to facilitate building and extending relationships between schools. The video conferencing classes were referred to respectively as Te Kura Ataata and Te Kura Hiko in each cluster, and both encountered a number of issues in implementing video conferencing classes. Developing a shared timetable for video conference lessons proved difficult until the appointment of a part-time KAWM co-ordinator in mid 2002. Initially the technology proved temperamental and the workload of the e-teachers, particularly within the wharekura, was very high.

Over time the quality and reliability of the technology improved, and the new bridge due for installation from the beginning of 2004 was expected to provide additional quality. The funding provided by the Ministry of Education to support online teaching enabled the wharekura to give the e-teachers more release time for preparation and greater administrative support. It was also found that all classes required a supervising teacher and this placed an additional burden on kura that were already facing staffing shortages. The demanding workload of e-teachers was partially addressed by strategies such as appointing a person to manage liaison with offsite students and providing support for resource development and production. There was a growing trend towards

electronic resource sharing between e-teachers. There was the potential to exploit this further, for example by establishing a database of electronic resources suitable to be used in the online classroom, but at the time of the evaluation there was not the critical mass of available electronic resources to make this worthwhile. The e-teachers themselves recognised the skills they developed through experience and felt they had much to offer new e-teachers.

Despite the challenges in implementing the online classroom, principals, teachers, and students were supportive of the video conferencing initiative and believed it was the best option in providing senior students with greater subject choice in te reo.

The uptake of online classes offered by Paerangi teachers to Paerangi students was more limited. However, because they did not require lessons to be in te reo, Paerangi schools also had the option of online Correspondence School courses through video conferencing, and the numbers of students participating in these classes have increased. Student participation in Correspondence School courses was viewed as a pragmatic decision because it placed fewer demands on the school involved.

In both the wharekura and Paerangi Māori boarding schools, the effective implementation of the online classroom required e-teachers to think about their teaching in new ways. There was a need to plan ahead so that the online students had the required resources, and teachers needed to seek new ways to interact with their students to provide quality feedback. Hui were held at the beginning of the year for the online students and their teacher and at times during the year. These hui were seen as critical in developing the relationships needed for teachers to effectively support their students' learning.

The video conferencing equipment was used for online classes for students, online social hui for students, online meetings for principals, and in Te Kura Hiko, for online meetings of hostel staff. These activities were dependent on careful planning by a co-ordinator and in the case of the online classes also relied on the support of a supervising teacher. It was found that the online lessons needed to be supported by opportunities to build a relationship between the teacher and online students and this was achieved through face-to-face hui. These hui, and other inter-school events, helped to build relationships between the students in the respective clusters, an opportunity valued by the principals, teachers, and students.

The laptops and professional development

There was general satisfaction with the ICT Laptop professional development programme although it was thought it would have been more valuable to spread the programme over 2 years rather than having it condensed to 13 weeks. Access to a laptop and the skills to use it enabled teachers to use computers on a regular basis to plan, gather and prepare resources, complete administrative tasks, and communicate with other teachers. Further professional development and onsite technical support were seen as key to improving classroom-based ICT use.

The school-based ICT infrastructure

The school-based ICT infrastructure made a difference in schools, improving processes and opportunities for students to interact with ICT, despite a number of technological problems identified by most schools. By 2003 most schools were working to develop the "personnel infrastructure" that was needed for the effective use of the network as well as to support its ongoing technical development.

Teachers generally enjoyed their own and their students' better access to ICT, and wanted to use it. As the teachers became more experienced they were extending their ICT use from administration and lesson planning tasks to activities that supported their classroom programmes. Many teachers believed that the use of ICT within classroom programmes served to motivate and engage students by providing a greater variety of experiences. There was evidence of change in ICT use in all clusters over the 2-year evaluation period. While learning to use the tools of ICT appeared to be the primary purpose of many classroom ICT-related lessons, students also began employing a greater range of software programs and utilising multimedia as well. In 2003, ICT activities directly related to learning within other curriculum areas, such as literacy and numeracy, were more evident in the classrooms observed within Project Rorohiko. In all the clusters, however, many principals and teachers expressed concern about their ability to access ongoing professional development that would enable the more effective integration of ICT in all curriculum areas.

The principals in all clusters believed that the ongoing maintenance and development of their ICT infrastructure will require continued additional resourcing, particularly in the form of expert technical assistance. Most principals also identified the need for assistance with professional development to support teachers' use of ICT within the context of all curriculum areas.

The relationships between the uses being made of KAWM and characteristics of schools, students, teachers, professional development, and community

There did not appear to be any relationship between the uses of KAWM and the size or type of school. Over the 2 years there was little community use of ICT in any of the schools, although some intended to encourage this development.

There were two key factors in the variable use made of KAWM in the schools within this evaluation. First, the "readiness" of the school to utilise the support and resources provided. "Readiness" was influenced by factors such as the ability to get the required infrastructure installed and operating effectively, having the necessary administrative and technical support systems in place, and having sufficient professional development to enable everyday use of ICT. Second, the degree of alignment between the initial reasons the school joined KAWM, and the aims of the KAWM initiative itself. Most of the wharekura, for example, were highly motivated

to get the video conferencing infrastructure in place, as they saw it as the best option in providing their senior students with greater curriculum choice.

The factors that allowed the best use of KAWM

Leadership

Successful implementation of initiatives such as KAWM are dependent on the principal for leadership, guidance, organisation, and motivation—an issue raised by a number of teachers interviewed. Most principals were positive about KAWM although initially some had reservations because "it came like a bolt out of the blue" and they did not have enough time to consider the long-term practicalities of the project. Many principals were happy with the educational promise of the equipment and technical support, and committed to the project on this basis. Generally, the principals were unclear about what was expected to be achieved through their involvement in KAWM and it took time to determine their roles and responsibilities. As principals determined their school's own priorities around ICT, they focused on those most relevant to them at the time, and so there was not necessarily a direct link between the school-based goals and those of the KAWM project. It was not just the principal's leadership that was important as there was evidence of distributed leadership for ICT development, especially in the larger schools. The role of the enthusiastic and committed teacher was another key factor that facilitated good use of KAWM.

School networking

The cluster structure provided support networks for many schools, including technical, professional, and collegial support. It was somewhat easier for the wharekura and Paerangi schools to network effectively on a number of levels as the schools within these clusters had a long history of networking prior to KAWM and much more in common than just belonging to this initiative. The cluster arrangement provided an opportunity for inter-school sharing of resources and expertise and there have been some initial developments, such as sharing of resources between e-teachers, but time and other resource constraints have limited such sharing. There is considerable scope for building on the existing cluster arrangements, and expanding these. This would provide the opportunity for more interactive relationships between teachers who are seeking to develop their knowledge of teaching and learning using ICT.

Equipment and technology

Reliable equipment was key to making the best use of KAWM initiatives. This depended on not only the quality of the equipment provided, but also on the quality of the ICT and physical environment it went into, the compatibility of the new and exciting systems, the availability of adequate technical support, and on what people expected the equipment to be able to do. Initially, high expectations that could not be met within the expected time frame dampened some people's enthusiasm. Some schools that already had an established ICT infrastructure were already in a

state of "readiness" to implement another initiative such as KAWM, while others felt they were always "trying to catch up".

The major issue at the end of the KAWM evaluation is the ability of the schools to maintain the current equipment and to make informed decisions about updating hardware and software. These are complex decisions as they need to take account of a variety of factors such as: the values and priorities of the school; purposes for which the school is using ICT, for example online classes; financial constraints; the expertise of teachers; and the availability of technical and professional support. In developing a long-term strategy to address issues of maintenance and development, principals and boards need a clear indication of the nature of ongoing targeted support from the Ministry of Education so they can factor this alongside their own resource allocation.

Technical support

Technical support was available to all schools, but immediacy of access to it became an issue for schools, even the schools that are not remote. Those schools that hosted the cluster ICT technician were definitely at an advantage, and after 3 years most schools thought all schools should have access to technical support on their own site at all times, as the on-call support they experienced was not satisfactory.

Professional support and professional development

Professional support provided by the KAWM co-ordinator or the learning technologies facilitator/ICT lead teacher was another pivotal factor in the success of KAWM in schools. Such support is an ongoing issue because if progress to date is to be built upon, there is a need for professional development to move beyond a skills focus and into teaching and learning. Training for the online teachers, for example, provided them with the technical skills in using the video conferencing equipment. It did not provide the opportunity for the teachers to develop their pedagogical content knowledge in the context of ICT. Similarly, the majority of teachers using laptops and those who had the thin client networks in their classrooms identified the need for a concerted professional development programme to support their attempts to integrate ICT into their teaching.

Associated with this recognised need for knowledge about how to use ICT to support learning is a concern about having the time and expertise to select new software and other resources that best suit the needs of the teachers and their students.

Lessons from KAWM for future e-learning development in New Zealand schools

The KAWM evaluation provides useful messages for teachers, principals, professional development providers, and policy makers who seek to support similar kinds of e-learning developments in schools. The KAWM evaluation also provides an opportunity to examine some of the "big picture" issues for e-learning development in New Zealand. Three areas have been

highlighted as important for the consideration of e-learning development in New Zealand schools (Wenmoth, no date). The first area relates to the changes in thinking about curriculum and pedagogy that are often linked to the idea of learning in a digital age. In particular, the idea that the digital age will require new ways of thinking about "knowledge" (and hence, curriculum), and a shift towards "learner-centred" rather than "teacher-centred" pedagogies. This requires a fundamental shift in thinking from seeing knowledge as static, an artefact that can be shared and exchanged, to regarding knowledge as dynamic and evolving. For schools, this will require an increased emphasis on the processes of constructing knowledge and the skills required to do this. The KAWM evaluation highlights the need to provide clearer transitions or links between these future-focused ideas about teaching and learning in "digital age" schools, and the current curriculum, and teachers' current pedagogical practices.

The second area of concern pertains to issues of ICT infrastructure in a "networked" learning environment. The learning experiences of a networked learner depend heavily on the quality, accessibility, and reliability of the network to which they are linked, and this network comprises everything from computers and peripherals to the wires and infrastructure that link them together. Because a networked learning environment can transcend the immediate environs of the individual school, issues of standards and interoperability become relevant. The KAWM initiative gave the schools involved sufficient support to provide a "critical mass" of hardware, software, technical, and professional support for each one of the initiatives to make a difference to the schools involved. However, different standards of technology within and between clusters created some problems for the KAWM schools. Principals and teachers commented that the current ICT infrastructure was failing to keep up with their expectations for technological integration into teaching and learning. It was suggested that there needed to be a national infrastructure in place, centrally controlled and allowing all schools participating in a networked learning environment to have the same standard of technological infrastructure. The KAWM evaluation supports the need to define a networked learner/an e-learner and proceed to furnish this kind of learner with the appropriate standard and types of technology. With the limited resourcing schools have available, the technology issues will need to be addressed in a way which involves strategic and co-ordinated planning, development, and implementation that will see ICT effectively support learners.

The third area for consideration is the way that funding and support for schools, and the school system, is administered within the government's budget for education. The KAWM evaluation included discussion about appropriate structural arrangements needed to achieve excellent outcomes in e-learning including the roles of key players such as the Ministry of Education, the e-learning clusters, and individual schools. In every KAWM school there was comment about the role of the Ministry of Education in the project, from "joy" that it was actually happening, to "despair" about the extra workload participation entailed. The schools were grateful for the support they were receiving, however some were concerned about the ad hoc nature of the development, and schools were hoping for a co-ordinated approach to planning in the future.

Schools had concerns that KAWM was "always a project" and so they found it difficult to think of KAWM as part of their "normal ongoing business".

Schools thought the following issues could be addressed centrally rather than have individual schools "problem solve" their own way around these.

- Funding – the continuation/sustainability and level of funding and the criteria used for this.
- Technology – the standards currently in schools were not consistent enough to truly support the New Zealand networked learner.
- The learning environment – schools wanted furniture and teaching spaces that would enable ICT to be accommodated in every classroom.

School staff also commented on the need for further resource development and teacher professional development to support e-learning development in schools.

A co-ordinated approach to the development of a framework for e-learning in New Zealand, informed by research and best practice, would help to guide schools and policy makers. However, such a framework would need to achieve a balance between centralised decision making to support e-learning development in all schools, and schools' roles and responsibilities to self-manage in order to:

- meet their own educational goals and priorities; and
- develop approaches to curriculum and pedagogy that are appropriate to the schools' underlying educational philosophies and/or the specific needs of their learners.

Section One

Introduction

Background

Kaupapa Ara Whakawhiti Mātauranga (KAWM) was initiated during the second quarter of 2000 and comprised the following initiatives:

- the online video conferencing classroom, operating in wharekura, Paerangi Māori boarding schools,[1] and four area schools on the East Coast;
- the Wharekura Expert Teachers' initiative, supporting online teachers in the wharekura;
- laptops and ICT professional development for teachers in wharekura, Paerangi schools, and schools on the East Coast; and
- school-based ICT infrastructure, supplying thin client networks with high-speed network and Internet connections to wharekura, Paerangi schools, schools in the Wairoa and Gisborne areas, and schools on the East Coast.

There are two common elements in all these projects. The first is the establishment of cluster groups of schools to encourage greater sharing of resources and expertise. The second is the use of information and communication technologies (ICT) to address critical education issues, such as ensuring the full secondary curriculum is available to students in wharekura and Paerangi schools.

The five school clusters established within the umbrella of KAWM are:

1. the wharekura cluster;
2. the Paerangi schools' cluster;
3. the Wairoa schools' cluster;
4. the Gisborne schools' (Kiwa[2]) cluster; and
5. the East Coast schools' cluster.

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[1] The Paerangi Māori boarding schools will be referred to as the Paerangi schools for the remainder of this report.

[2] The Gisborne cluster of schools is referred to as the Kiwa cluster, as the schools are all associated with the Kiwa Education Partnership.

The stated aims of KAWM are to:

- improve student achievement;
- improve school performance;
- strengthen school and community relationships;
- upgrade school ICT infrastructure; and
- improve teachers' professional capability through ICT.

KAWM attempts to meet these aims by building on the initial school improvement initiatives and employing different strategies within the five clusters. The wharekura cluster participated in all four aspects of KAWM. They received video conference kits with technical support, training for the wharekura e-teachers, laptops and professional development for their teachers, and school-based ICT infrastructure. Included within the wharekura cluster were the kura within Te Rangitāwaea.[3] The Paerangi schools' cluster participated in three aspects of KAWM and received the video conference kits with technical support, laptops and professional development for teachers, and school-based ICT infrastructure. The Wairoa schools' cluster and the Gisborne schools' (Kiwa) cluster participated in one aspect of KAWM only and received thin client networks with high-speed network connections and technical and learning facilitation support. This aspect, school-based ICT infrastructure, is called Project Rorohiko for the Wairoa and Kiwa clusters. Table 1 summarises the aspects of KAWM in which each of the clusters participated.

Table 1 ***Aspects of KAWM each of the clusters in this evaluation participated in between 2002–03***

Cluster → ***Aspect ↓***	***Wharekura***	***Paerangi Māori boarding schools***	***Gisborne & Wairoa***
Online classroom			N/A
Wharekura Expert Teachers' initiative		N/A	N/A
Laptops and ICT professional development for teachers			N/A
School-based ICT infrastructure			

The online classroom operating in the wharekura is called Te Kura Ataata while in the Paerangi schools it is called Te Kura Hiko. The wharekura expert teachers' initiative was a separate Ministry of Education initiative that arrived at the same time as KAWM and supported similar aims and therefore became part of the overall project for wharekura, as the Wharekura Expert

[3] The KAWM project is part of a larger project in the East Coast schools' cluster called Te Rangitāwaea. The evaluation of the KAWM aspect of Te Rangitāwaea has occurred as part of the evaluation of Whaia te iti Kahurangi carried out by NZCER for the partnership between Te Rūnanaga o Ngati Porou and the Ministry of Education, and is not included in this report.

Teachers' initiative. The wharekura e-teachers are the online teachers for the wharekura online classroom. A brief description of each of the four aspects of KAWM follows.

The online classroom (using video conferencing)

Te Kura Ataata (wharekura)

The aim of the online classroom using video conferencing, and the associated Wharekura Expert Teachers' initiative, was to provide some resolution to the issues facing kura kaupapa Māori as they extend into wharekura. It particularly addressed their capacity to offer a full senior secondary curriculum, given their small size, the lack of resource materials in te reo Māori, and a continuing shortage of experienced teachers who have the depth of curriculum knowledge and language expertise required to teach in wharekura.

The idea was that the use of video conferencing, supported by the network and the capacity to easily transfer files between students and teachers, should provide students with access to teachers with subject and language expertise and other resources, thus overcoming capacity problems at any individual school.

Lessons in Te Kura Ataata are in te reo Māori. There were 20 wharekura taking part in KAWM. Some are affiliated with Te Rūnanganui Nui o Ngā Kura Kaupapa Māori o Aotearoa, using Te Aho Matua as the basis for their curriculum, and some are not. Each kura participating in the online classroom aspect of the KAWM project was supplied with video conferencing capability (though some cannot use it because of a lack of affordable bandwidth or lack of any bandwidth at all; for example, some kura in the Tuhoe area). The video conferencing is supported by an infrastructure which networks the wharekura and provides professional development for the online teachers, gives some technical maintenance after installation, and payment for connection and usage. Most kura received the video conferencing equipment in October or November 2000. However, not all kura had their ICT infrastructure in place then. By 2003, all kura had their ICT infrastructure in place.

Online classes using video conferencing in wharekura began in 2001, with five subjects at Year 11, and 12 wharekura participated. In 2002, six subjects at Years 11, 12, and 13 were offered, and 15 wharekura participated. In 2003, eight subjects were offered at Years 11, 12, and 13, and 11 wharekura participated. These changes in participation are discussed later in this report.

Te Kura Hiko (Paerangi schools)

The provision of the online classroom using video conferencing for the Paerangi schools was also intended to provide some resolution to difficulties they have offering a full curriculum range to their students, as they are also small secondary schools, in some cases similar in size to many wharekura.

The Paerangi schools' online classroom was called Te Kura Hiko. Paerangi schools did not have an e-teacher initiative, such as the Wharekura Expert Teachers' initiative, linked to their online classroom, although they did have e-teachers. During the evaluation period, the lessons in Te Kura Hiko were delivered in English.

In 2001, two subjects were offered online in the Paerangi schools, at Year 12, using teachers from two different schools. The subjects were music and computer studies. In 2002 and 2003, the online classroom was mainly used for classes offered by The Correspondence School, plus the two Paerangi online teachers taking music and computer studies, and an online te reo Māori class from Waikato University. Initially, five out of the six Paerangi schools participated in KAWM and in 2003 the sixth school participated.

The Paerangi schools also used the video conferencing equipment for a number of non-teaching activities and these are discussed in Section Three of this report.

The Wharekura Expert Teachers' initiative

The wharekura expert teachers' initiative (WET) was a separate Ministry of Education initiative that arrived at the same time as KAWM and was included in the KAWM project as it supported similar aims. Initially it was envisaged that this would comprise a group of itinerant teachers, expert in their subject areas, teaching across different wharekura, for example via video conferencing. However, under the KAWM model, the pool of e-teachers in wharekura were not itinerant "expert teachers", but teachers who were already teaching subjects within particular wharekura. Thus it became more appropriate to describe these as "wharekura e-teachers" rather than "wharekura expert teachers". Both Paerangi and wharekura e-teachers received some professional training for their role as online teachers. This was most commonly a 3-day training course based around technical aspects of video conferencing, with a small amount of time spent on pedagogical aspects of teaching online. The wharekura e-teachers were also provided with laptops and participated in the associated professional development.

Use of laptops and ICT professional development

One of the KAWM aims was to provide every teacher in wharekura and Paerangi schools with the personal use of a laptop computer. Priority went to principals and teachers participating in Te Kura Hiko and Te Kura Ataata. Some teachers at wharekura and Paerangi schools were already taking part in Te Hiringa i te Mahara, a professional development initiative for Māori secondary teachers,[4] and therefore already had laptops, and were already participating in an ICT professional development programme.

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[4] The NZCER evaluation of Te Hiringa i te Mahara (THM), including the THM ICT Professional Development programme can be located on the THM website, www.thm.co.nz.

Teachers who were provided with a laptop computer were required to take part in a 2-year ICT professional development programme, after which their school could give them the option of buying the laptop. Teachers were also given an unlimited Internet account for 6 months and training through hands-on workshops and online tutorials (a 13-week series of 2-hour sessions, using audio conferencing). The laptops belonged to the schools (for the first wave of professional development), or were leased to them (for subsequent waves of professional development).

By the end of 2002, approximately 192 wharekura and Paerangi teachers had participated in the 2-year ICT professional development programme. In November 2002, the KAWM Laptop programme was superseded by STELA (Laptops for Secondary Teachers) and in July 2003 by TELA (Laptops for Year 7 to 13 Teachers). These schemes are part of the government's investment in developing teachers' confidence and competence in the use of ICT for teaching and learning, class management, and administration. All Year 7 to 13 teachers in wharekura and Paerangi schools qualify for this scheme.

Access to laptops is aimed at building teachers' fluency in the use of information and communication technologies, in particular computers and the Internet. This use can include access to up-to-date and appropriate resources and enable interaction with peers in local, national, and international networks. They can also be used to reduce administrative workloads, enabling more attention to teaching.

Provision of school-based ICT infrastructure

This aspect of KAWM involved the provision of "thin client" computers linked to a powerful server in each school. This infrastructure enabled a higher level of performance from recycled computers, aiming to increase student access to ICT and its use in learning.

The Kiwa cluster was allocated 1,200 computers, and Wairoa 450 computers (one computer for every four students). The Kiwa and Wairoa clusters were also provided with technical support and access to a learning technologies facilitator, and this was called Project Rorohiko. The wharekura cluster received 430 thin client computers (ratio 1:3) and the Paerangi cluster received 174 thin client computers (ratio 1:3). The Ministry of Education provided financial assistance to help schools set up the cabling infrastructure through their Financial Assistance Scheme where they provided up to a 50 percent subsidy, with the schools providing the balance.

Research framework and questions

NZCER was contracted by the Ministry of Education to undertake an evaluation of the KAWM initiatives during 2002–03.

The key questions guiding this research are:

1. What use is actually being made of each of these four aspects of KAWM? What factors lie behind any differences in use?
2. What are the relationships between the uses being made of these three ICT tools, and the Wharekura Expert Teachers' initiative, and wharekura and school curriculum organisation and content, teaching approaches, learning, student interest, teacher interest, motivation, retention, professional support and development, inter-school collaboration, school management, and community involvement and support for wharekura and schools?
3. What are the conditions, skills, learning, and resources which allow the best use of KAWM, and, conversely, what are the conditions, skills, type and amount of learning, and resources, which inhibit its use, or which raise questions about its sustainability?
4. What are the implications or lessons to be drawn from the initial implementation and use of KAWM for other policies and initiatives?

Methodology

The main focus in this evaluation was to find out how the KAWM initiatives were actually experienced in schools, by teachers, students, and principals, and therefore to gain an in-depth understanding of how people used the resources. The intention was that this information would complement the Ministry of Education's own monitoring through cluster milestone reports. Table 2 sets out the framework for the data gathered in this evaluation.

Table 2 ***KAWM research outline 2002–03***

Clusters →	***Wharekura***	***Paerangi Māori boarding schools***	***Kiwa***	***Wairoa***
Number of sample schools →	***6 kura sampled 2002–2003***	***3 schools sampled 2002–2003***	***4 schools sampled – 2002*** ***6 schools sampled – 2003***	***4 schools sampled – 2002*** ***6 schools sampled – 2003***
Aspects of KAWM each cluster is involved in →	1. Te Kura Ataata (online classes using video conferencing) 2. Wharekura Expert Teachers' initiative 3. Laptops and ICT PD 4. School-based ICT infrastructure	1. Te Kura Hiko (online classes using video conferencing) 3. Laptops and ICT PD 4. School-based ICT infrastructure	4. School-based ICT infrastructure (Project Rorohiko)	4. School-based ICT infrastructure (Project Rorohiko)
Data collection methods →	Interviews with: ➢ Principals ➢ Teachers (ICT) ➢ Teachers (online) ➢ Teachers (supervising online class) ➢ Laptop teachers ➢ E-teachers ➢ Online students ➢ ICT students ➢ KAWM co-ordinator Observations of: • Online classes • Students using ICT in class	Interviews with: ➢ Principals ➢ Teachers (ICT) ➢ Teachers (online) ➢ Teachers (supervising online class) ➢ Laptop teachers ➢ Online students ➢ ICT students ➢ KAWM co-ordinator ➢ Hostel managers Observations of: • Online classes • Students using ICT in class	Interviews with: ➢ Principals ➢ Teachers (ICT) ➢ ICT students ➢ KAWM co-ordinator ➢ ICT Lead teacher & Technician Observations of: • Students using ICT in class	Interviews with: ➢ Principals ➢ Teachers (ICT) ➢ ICT students ➢ KAWM co-ordinator ➢ LTF & Technician Observations of: • Students using ICT in class

Data were collected during two fieldwork visits between Aug–Sept 2002, and Aug–Sept 2003.

We followed this design in the data collection for 2002 and 2003 as much as possible. We were not always able to complete all the planned interviews and observations in every school. All the schools we visited were helpful and co-operative in meeting our research needs. However, some schools were unable to accommodate all our needs at the time we visited due to reasons mostly beyond their control. For example, a staff member with whom we had organised an interview was away sick the day we visited. On one occasion an online class we were scheduled to observe was cancelled due to the online teacher being unavailable to deliver the lesson. Similarly, during a class where we were observing students using computers, we were unable to observe the entire lesson because there was a power failure.

The wharekura sample was chosen to include:

- three medium-large wharekura, with one providing an online teacher, and two not; and

- three small wharekura, one providing an online teacher, and two not.

This was around a third of the 15 wharekura participating in Te Kura Ataata in 2002, although a higher proportion in 2003 as only 11 wharekura were participating that year. The sample included wharekura that gained access to online teachers from other wharekura, since the sharing of expertise and ability to broaden the curriculum offered was one of the main aims of the initiative.

All the research instruments were given to the wharekura KAWM co-ordinator to gain feedback about the design and instruments, and to gain whānau approval for their wharekura to take part in the research.

The first data were collected between August and December 2002. We did not collect as much data on teachers' use of laptops and the school-based ICT network infrastructure in the wharekura as planned, since the schools were focused more on the use of the online classroom, Te Kura Ataata, and, as a sign of the continued pressure on wharekura staffing, teachers could not always make themselves available for interview. The second year of fieldwork was undertaken between August and December 2003. Again there were some difficulties encountered in collecting data as planned due to last minute programme changes or staff being unavailable on the arranged day.

The Paerangi schools' sample was chosen to include:

- two schools providing online teachers; and
- one school not providing a teacher, and which did not join Te Kura Hiko in 2002.

This sample covered half the Paerangi Māori boarding schools.

All research instruments were given to the Paerangi Māori boarding schools' KAWM co-ordinator to gain feedback about the design and instruments, and to gain whānau approval for their schools to take part in the research.

The first data were collected between August and December 2002, and we collected the second data between August and December 2003.

The Kiwa and Wairoa cluster samples involved four schools in each cluster in 2002. The schools were chosen to provide a range in terms of type and location in each cluster. Data were gathered between August and December 2002. In 2003, we returned to seven of the eight schools we visited in 2002,[5] that is, three Kiwa schools and four Wairoa schools, and we added three Kiwa schools and two Wairoa schools, to give a total of 12 schools in 2003.

[5] One Kiwa school withdrew from the evaluation in 2003 and was replaced with another school.

The draft research instruments[6] were reviewed by Te Rūnanganui o Ngā Kura Kaupapa Māori o Aotearoa, the Kiwa Education Partnership, the Wairoa Principals' Association, and the Ministry of Education, to ensure that they met participants' needs before the research began.

This report

The first report of this evaluation was completed in June 2003 and reported on the findings of the fieldwork completed in 2002. This report describes what we found in the two rounds of data collection in 2002 and 2003.

We start with four sections, each providing contextual information and discussion about the impacts and differences each aspect of KAWM has made to the respective clusters. Section Two provides information on the wharekura cluster, which received the full set of KAWM initiatives, focusing particularly on the use of video conferencing technology to provide online classes across schools. The discussion of the Paerangi schools' cluster experiences in three aspects of KAWM follows in Section Three. Then we discuss the experiences of the two clusters which received the thin client networks only, as part of Project Rorohiko. The Kiwa schools' cluster experiences are discussed in Section Four, followed by the Wairoa schools' cluster in Section Five.

Sections Six and Seven provide two levels of analysis of the KAWM evaluation. Section Six provides an evaluation of KAWM in relation to its original aims. It addresses the first three research questions guiding the research. Section Seven provides a second level of analysis of the KAWM model, addressing the fourth research question, which asks, "What lessons can be drawn from KAWM for future e-learning developments in New Zealand schools?"

[6] Refer to the appendices for research instruments.

Section Two

Ngā Wharekura

Introduction

The wharekura cluster was involved in all four aspects of KAWM:

- Te Kura Ataata (the online classroom using video conferencing);
- the Wharekura Expert Teachers' initiative;
- the laptops for teachers and associated professional development; and
- the school-based ICT infrastructure.

Six of a total of 20 wharekura nationally were included in our sample**.** The wharekura were chosen on the advice of representatives of Te Rūnanganui o Ngā Kura Kaupapa Māori o Aotearoa. We aimed to include wharekura that provided online teachers and those that did not. The kura ranged in size from 41 students to 140 students,[7] four were located in the North Island and two in the South Island. They were all area schools and they all affiliate to Te Aho Matua. Four schools were urban and two were rural.

The purpose of the interviews and observations was to gain insights that would assist in informing the four key research questions. In the context of the wharekura these were: what use is being made of the four aspects of KAWM; what are the relationships between the uses being made of KAWM and aspects of schools, students, teachers, professional development, and community; what are the factors that will allow the best use of KAWM; and what implications can be drawn from the findings of this evaluation for the future?

In 2002 we interviewed six principals, eight laptop teachers, four wharekura e-teachers, four online supervising teachers, the KAWM co-ordinator, and four groups of online students. We observed four online lessons, and three ICT-related classes.

In 2003 we interviewed six principals, seven laptop teachers, four wharekura e-teachers, three online supervising teachers, five teachers who were using ICT as part of their curriculum delivery, one resource co-ordinator, and two groups of online students. We observed four online classes and six ICT-related classes.

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[7] These numbers refer to the total number of students in the kura. The wharekura students are part of this number.

The table below provides information about the interviews and observations we carried out on our visits.

Table 3 ***Interviews and observations in wharekura***

School ID →	*Wk 1*		*Wk 2*		*Wk 3*		*Wk 4*		*Wk 5*		*Wk 6*	
Research activities/participants↓	*2002*	*2003*	*2002*	*2003*	*2002*	*2003*	*2002*	*2003*	*2002*	*2003*	*2002*	*2003*
Principal	1	1	1	1	1	1	1	1	1	1	1	1
Laptop teachers	1	3	-	-	1	1	2	-	1	2	3	1
Online teachers	-	1	-	-	1	1	-	-	1	1	2	1
Online supervising teacher	1	1	-	-	1	-	1	-	1	1	-	1
Online class observation	1	-	-	-	1	3	1	-	1	-	-	1
Online students	5	-	-	-	3	3	2	-	4	-	-	4
ICT teacher	2	1	1	1	-	-	3	1	-	1	-	1
ICT students	-	5	-	3	-	3	2	3	-	4	3	5
ICT class observation	-	1	-	1	-	1	2	1	-	1	1	1

Te Kura Ataata (the online classroom using video conferencing)

The aim of Te Kura Ataata, along with the Wharekura Expert Teachers' initiative, was to provide some resolution to the issues facing kura kaupapa Māori as they extend into wharekura. These are their capacity to offer a full secondary curriculum given their small size, their lack of resource materials in te reo Māori, and a continuing shortage of experienced teachers who have the depth of curriculum knowledge and the language expertise to teach in wharekura. The use of video conferencing, supported by networking and the ability to transfer files, aims to provide students in these schools with access to teachers with subject expertise, thus assisting to address capacity problems at any individual school.

Reasons for getting involved in the Te Kura Ataata component of KAWM

The principals in the wharekura identified three main reasons for participating in Te Kura Ataata. These were the opportunity provided to offer a wider senior school curriculum, the fact that it met an identified need, and that it provided new possibilities for teachers and students.

Potential to offer a wider curriculum to senior students

The primary reason given by the principals of the wharekura for participating in Te Kura Ataata and the Wharekura Expert Teachers' initiative was to meet their immediate need of delivering a full curriculum to their senior students. The small number of students at Years 11–13, in particular, means that some wharekura do not have the staffing capability and capacity to teach in some senior curriculum areas. Some wharekura were unable to attract staff who have both the curriculum expertise and the experience in teaching in te reo Māori. The principals thought that the number of teachers with this dual expertise was very small and talked about the "desperate

need" to increase the number. One principal said that sometimes there are no teachers who can fill their requirements, simply because they do not exist either locally or nationally.

Addressing an existing need

One principal commented that the success she saw of KAWM in the wharekura was due to the deep "roots" KAWM has in the wharekura movement. In an attempt to offer a full curriculum the wharekura movement had proposed a similar project before the Ministry of Education offer for them to participate in KAWM. Prior to this, individual wharekura had experimented with a number of initiatives in order to offer students wide curriculum opportunities.

For example, during the mid 1990s, one wharekura was keen to have their students learn science. As they were unable to find a teacher who could teach science in te reo Māori, they considered an alternative option. This was to approach an ex-science teacher to teach a science programme in te reo Māori outside the normal school timetabled hours. The teaching occurred offsite and in large blocks of time. It was an arrangement that "stepped outside the square" and met the objective of the students learning science in te reo Māori. The principal of the wharekura was the Chairperson of Te Rūnanganui o Ngā Kura Kaupapa o Aotearoa at the time, and as the group discussed the lack of teachers in some curriculum areas, they saw the need to share the specialist teachers between all the wharekura. The vehicle of video conferencing was just becoming a viable option in distance education. Initially they considered that the specialist teachers would travel to the wharekura as they were needed. However the large physical distances between wharekura made the video conferencing option more appealing, appropriate, and practical.

At that stage, wharekura were not keen to participate in The Correspondence School primarily as the language of The Correspondence School was English and the relationship between the teacher and the student was paper-based rather than face-to-face. As the first language of their students was te reo Māori, the wharekura felt their students would have to "teach themselves English" in order to participate. A proposal was given to the Ministry of Education from Te Rūnanganui o Ngā Kura Kaupapa Māori o Aotearoa in the late 1990s to address the issue with distance learning technology and e-teachers. This initial proposal was declined. However, eventually the Ministry of Education supported the vision of this wharekura and Te Rūnanganui o Ngā Kura Kaupapa Māori o Aotearoa through the inclusion of video conferencing as an aspect of KAWM.

Providing new opportunities for teachers and students

As with the teachers at Paerangi schools, many of the wharekura teachers were already participating in the Te Hiringa i te Mahara project. The principals saw positive outcomes of this project, including upskilled and confident teachers and an increase in the use of technology in the school. Principals saw the potential of KAWM in this area as well as the opportunities it might provide for extending the learning context for their students. Some wharekura, for example, were

using video conferencing to broaden the curriculum for their junior and Year 9 and 10 students such as participating in virtual fieldtrips at the Rotorua Museum:

> This initiative means that we don't have to feel so isolated. (Principal)

All six principals interviewed commented on the social aspect of participation in the programme. Video conferencing provided a tremendous opportunity for students and teachers to build relationships with other wharekura and the Paerangi schools:

> Socially for the students it has been excellent for them. (Principal)

Use of Kura Ataata in 2002 and 2003

In Te Kura Ataata the online/video conferencing teachers are te reo Māori experts and have sufficient curriculum knowledge in senior secondary subject areas. In 2003 there was also one lecturer involved in Te Kura Ataata who taught university level te reo Māori courses to the wharekura students. A university mathematics lecturer was also involved in delivering classes as professional development in mathematics to wharekura teachers through video conferencing. The aim of this was to upskill teachers who were already trained as e-teachers in another curriculum area.

The number of wharekura participating in video conferencing over the 3 years was 12 in 2001, 15 in 2002, and 11 in 2003. Participation levels in video conferencing varied over the 3 years of KAWM for a number of reasons which are described below.

In 2002, one wharekura had nine students participating in Te Kura Ataata. In this kura no students participated in Te Kura Ataata in 2003 because of the low achievement rates of the online students in 2002 relative to the students in the face-to-face situation. The principal strongly believed that the main reason for this was because they were unable to have a supervising teacher present during online sessions to support the online teacher and students. In 2003 the kura decided that it would be better to focus on looking at ways of addressing this issue before any further participation would take place.

Another wharekura principal reflected in 2003 about their participation rate, which was 12 students in the first year, no students in the second year, and only four students in the third year. While the principal was adamant that they fully supported KAWM, they felt their experiences with video conferencing in the first year where their students did not respond very well, forced them to "take time to make it work for their kids". They took this extra time to consider and manage such issues as supervision and availability of online learning resources. They allowed their students to participate in the university te reo Māori course during 2003 because they wanted to continue to provide a physical presence of video conferencing in the wharekura:

> We are committed to KAWM and see our role now is to continue to look at ways to optimise student learning and achievement by continuing to develop ways this can work for our tamariki. (Principal)

This principal was also prepared to support KAWM by encouraging her teachers to teach online from her school but in 2003 would not allow her own students to be part of the class. These students are taught face-to-face by the teacher at an alternative time.

Working through the challenges of Te Kura Ataata

During 2002 and 2003 the principals involved in Te Kura Ataata encountered three challenges in effective implementation: timetabling; staffing; and quality outcomes for students.

Timetabling

In order to facilitate video conferencing across a number of schools there needed to be a shared timetable between the schools. Initially the wharekura found setting up the shared timetable difficult, as the principals themselves (as the leaders of KAWM within the schools at that time) were each too busy to take on the responsibility to co-ordinate this. One of the principals commented that this could be the reason participation in this aspect of KAWM was not initially as great as expected. The appointment of a part-time KAWM co-ordinator for the wharekura under the Rūnanganui was a major step towards being able to develop a shared timetable across all the wharekura. The co-ordinator's job was stressed by the principals as being very important, primarily to relieve their workload but also to provide the time to effectively oversee and co-ordinate activities for the cluster schools. In some wharekura the shared timetable had an impact on the existing programmes because the timetables clashed, and often students had to leave an onsite class to attend a video conference class. The video conferencing timetable for each school was set in place first, and the remaining school-based programmes were timetabled around this.

The shared timetable in 2002 offered 14 80-minute online sessions per week, covering six subjects. The subjects were Year 11 and Year 13 hitori (history), Year 11 pāngarau (mathematics), Year 11 pūtaiao (science), Year 12 rorohiko (computing), and Year 11 toi (art).

Similarly, the shared timetable in 2003 offered 20 online sessions per week of which 10 were 80-minute sessions and 10 were 60-minute sessions, covering eight subjects. The subjects were NCEA Level 1 and 2 pāngarau (mathematics), NCEA Level 1 hitori (history), NCEA Level 1 pūtaiao (science), Year 12 and Year 13 rorohiko (computing), NCEA Level 1 toi (art), and University Level 2 te reo Māori.[8]

While the shared timetables suggest that wharekura had a relatively wide choice of potential online subjects, the reality was that not all who wanted to did participate. One of the reasons for this was limitations with the equipment. Teachers and principals commented that only three schools could be accommodated on the bridge at a time without causing technical difficulties during 2002 and 2003. However, this problem appeared to have been solved for 2004 by the

[8] See Appendix C to view the timetable for Te Kura Ataata 2003.

purchase by the Ministry of Education of a new bridge that was able to accommodate a larger number of schools at a time.

Staffing

The wharekura face continuing teacher supply problems and the principals interviewed considered video conferencing to be a permanent fixture in their schools. They did not expect the government to change staffing formulae in the near future to allow them to have more staff with relatively small school rolls. Also, they did not expect the numbers of senior subject specialist teachers to increase fast enough to meet their needs. One wharekura that was unable to attract staff who have both curriculum expertise and experience in teaching in te reo Māori encouraged and supported a parent to finish a mathematics degree at Massey University so that the parent can return to the kura to teach mathematics. This strategy was seen as one possible way of addressing the shortage of wharekura senior subject specialist teachers and e-teachers.

All principals expected that their rolls may grow in the future and therefore they could expect staffing entitlements to increase eventually, but most were conservative in their expectations. One principal thought that a new way of looking at staffing entitlements could be to regard the e-students as a moving or roving body of students who could be included on the roll of the school supplying the e-teacher as a percentage of a full-time student, to qualify for part of an entitlement for a staff member in the school.

The wharekura received video conference classes because they did not have a teacher for this subject, nonetheless they still had to supply a teacher to supervise the online class, manage the operation of the valuable equipment, and provide tutoring support. Therefore, this effectively took a staff member away from another class. The staffing problem, which in some cases initiated the need for the video conference classes in the first place, was exacerbated. Some wharekura managed to turn this "negative into a plus" by using the supervision as a professional development opportunity for the supervising teacher. The supervising teacher was able to learn content knowledge and teaching practice from the online teacher.

Quality outcomes for students

While the principals of all the schools hoped that video conferencing would improve the educational achievement of their students, ways of measuring this had not been set up prior to the beginning of the project so they were unable to actually determine this. They were relying on anecdotal information from teachers and students to inform them about this aspect and they all tended to confuse increased participation with quality outcomes. However, after 3 years of the KAWM project, principals were beginning to consider ways to improve student educational achievement in the online classroom, as outlined below, based on their experience to date.

Sustainability

In 2002 the principals expressed real concern about future funding of the programme. However, improved understanding about the funding for the KAWM project enabled principals to think about different ways the money could be used to achieve their goals. In 2003 some principals used this more secure future to take a slow, cautious, and considered approach to implementation. While supportive of video conferencing they were taking time to rethink and strategise about ways to ensure the longer-term success of the online classroom based on their practice and experience to date. These include ways of ensuring that the online teacher has support from a kaiāwhina (support teacher or teacher aide) in the classroom for all video conference lessons, as well as in the operational area of liaising with offsite students. Another area is ensuring the availability of appropriate learning resources for the online teacher and the students. One principal was thinking through issues such as the optimal number of offsite students and the number of offsite sites for an effective online class, the viability of having onsite students in the class as a teacher teaches by video conferencing, the best pedagogical approaches for Māori students in the online classroom, and the difference in pedagogy between curriculum areas suggesting that some subjects are better "suited" to be taught by video conferencing.

The KAWM co-ordinator

In the first year of KAWM it was recognised, particularly by principals, that a person was needed to co-ordinate a number of KAWM activities for the members of the cluster involved in video conferencing. The KAWM co-ordinator for the wharekura cluster was appointed at the beginning of 2002. Initially, this position was half-time and this person assumed responsibility for the liaison aspects of the KAWM project. This included liaising between the wharekura, with technicians, the Ministry of Education appointed programme manager, and outside agencies.

The appointment of a part-time KAWM co-ordinator was a major step towards being able to develop a shared timetable across all the wharekura. The co-ordinator was the first point of contact for the wharekura principals, and set up video conference hui with the participating wharekura at the beginning of each year and the beginning of subsequent terms in order to develop the timetable and plan other activities for the cluster. The co-ordinator also organised and facilitated professional development for the teachers. He convened hui with the wharekura teachers including online professional development sessions and meetings to discuss particular issues.

One of the major issues for the co-ordinator for the wharekura was the distance between the wharekura. One wharekura is in the far north of the North Island, and three are in the South Island. It was realised early in the project that the co-ordinator needed to meet face-to-face with school staff to sort through some issues. The travel demands because of the distance impacted on the workload stress for the co-ordinator. He suggested in 2002 that more co-ordinators be appointed to give coverage to the whole country and on a full-time basis to relieve the workload pressures. The co-ordinator expressed the need to have the operational and funding

responsibilities of the KAWM project for wharekura under the management of Te Rūnanganui o Ngā Kura Kaupapa Māori o Aotearoa. The co-ordinator believed this was going to occur in 2003. In late 2003 a national wharekura KAWM co-ordinator was appointed.

The wharekura e-teachers

The wharekura e-teachers were teachers who were already teaching in wharekura in particular curriculum areas, usually at Year 9 to 13. They have expert curriculum knowledge and language expertise to teach in wharekura. The aim of the Wharekura Expert Teachers' initiative was to provide the opportunity for students in other wharekura to have access to the curriculum knowledge and language expertise of these teachers, by video conferencing.

Training

The training undertaken by the e-teachers was funded by the Ministry of Education and included the provision of video conferencing equipment and training. It provided the teachers with the technical skills in using the video conferencing equipment, including operating the polycom (a machine that manages audio communication from multiple sites), the document camera, the video conferencing camera, and the monitors. The training looked at the best ways to set up rooms and equipment for online lessons, and the basics with regard to methodology around the technology use, such as the most effective font size for written information used under the document camera. However, the teachers realised once they began practising as e-teachers the training had not provided the opportunity to consider curriculum-specific ways to effectively implement online lessons that were engaging for students.

Some e-teachers commented that the 3-day training they were given to be online teachers was not satisfactory as it was compacted into a short amount of time and did not allow for reflection. These teachers said that when they were learning how to completely change the way they taught more time was needed to "come to grips with it". The teachers who were trained in the first phase of training said that there was a 6-month gap between the training and the practice as it took time for Te Kura Ataata to be set up:

> This meant that some of us went backwards and really needed another shot of training to get us up to speed again, but we never got it. (e-teacher)

One teacher commented that she made major changes to her practice by reflecting on her experience as an online teacher, rather than in response to the training she received. In particular she had to devise strategies to cope with the practical nature of her curriculum area.

All the e-teachers commented that while the training was not as in-depth as they now knew they needed, they were willing to use their experience to support newly trained e-teachers.

Overall, it was evident that the future of the online classroom by video conferencing for wharekura relies on pedagogically based professional development for current e-teachers and the encouragement of new e-teachers. One e-teacher commented that there was a lack of knowledge

about online teaching and learning, and how it can help kura, students, and teachers. This teacher strongly believed that there are good teachers out there who could be "awesome" e-teachers. She did not believe that the option of becoming an e-teacher was pushed enough, and felt there was a need for more hui to look at encouraging and supporting teachers to consider becoming e-teachers.

Challenges for wharekura e-teachers

When we first talked to the wharekura e-teachers in 2002 the major impact on them was an increase in workload and work-related stress. Reasons for the increase in workload included the need to learn new skills to enable them to use the technology effectively and to teach well without the students being physically in front of them. Other challenges were planning in advance, preparing sufficient resources in te reo, building good student-teacher relationships, and coping with the limitations of the technology.

WORKLOAD

During 2001 some teachers taught online after school hours following a full teaching day. This situation was not sustainable for the teachers or the students and the teachers decided that the online classes needed to be taught during the normal school day. The provision of incentives, such as management unit equivalents, provided the much needed recognition and acknowledgement that the e-teachers sought at this time. However, some principals were concerned that the remuneration for the e-teachers needed to be revisited, in light of new issues and concerns that arose, such as continued workload pressures in 2002. The e-teacher grant was "equivalent" to two management units for a full-time e-teacher. There was also the Te Kura Ataata Grant which was additional and under the discretion of the wharekura. The money in these grants provided by the Ministry of Education was to support the wharekura e-teachers and Te Kura Ataata by:

1. providing relief for the online teacher so they were able to prepare lessons;
2. paying for translation of curriculum resources into te reo for use in the online classroom;
3. paying for the development of curriculum resources in a format that enhances delivery and effectiveness of subjects in Te Kura Ataata;
4. paying for professional development opportunities outside of the current KAWM professional development opportunities;
5. paying for the development and implementation of collective curriculum initiatives and new external online learning opportunities; and
6. paying for research initiatives to support improved teaching and learning within Te Kura Ataata.

It was acknowledged by the principals that the grants mentioned above collectively provide a way of addressing some of the issues for the e-teachers. The provision of the grants has been important to wharekura because the teaching staff involved feel that this is some acknowledgement by the Ministry of Education about the real demands of being an online teacher and that it is now sharing responsibility with the wharekura to develop effective delivery strategies. Wharekura have begun

to strategise ways of using this grant to add value to the online classroom and therefore to support the online teachers. These include trying to increase the number of online teachers in their kura to help share the load and to provide support personnel in the class for the online teacher to co-ordinate the distribution and collection of teaching materials and completed student assessments. Some kura had developed their own "in-kura" training and developed expertise in resource development, teacher training strategies, and curriculum delivery strategies. Kura are also planning to ensure that a balance between providing and receiving online classes is maintained. One principal said there is considerably more pressure on a school if they are providing an online class, than if they are receiving an online class, because the teacher teaching the online class requires more hours for preparation than the teacher supervising the offsite online class.

Teachers had to work out the costs of being an online teacher and weigh these up against the benefits. One teacher commented that her online teaching took her away from her conventional classes and that her students were missing out on teaching time with her. Another said that the time taken to improve her online teaching skills increased the pressure associated with online teaching and impacted negatively on her job satisfaction. One of the e-teachers interviewed said, however, that in her second year of online teaching the workload was becoming more manageable because she was becoming familiar with the practice of teaching online.

PLANNING AND RESOURCE DEVELOPMENT

In 2002 and again in 2003 teachers commented that very few of their conventional class resources could be directly used for video conferencing and that they needed some alteration before using. One teacher prepared during her lunchtimes for her online classes held two afternoons a week. She also spent 5–10 hours a week translating into te reo Māori the work material needed for the classes. The art online teacher spent extra time creating models and samples to send to her online students to overcome the "learning at a distance" issue. However, the e-teachers agreed that as their experience in teaching online increased they were becoming more adept at preparing suitable resources and could more easily predict if a resource would be appropriate for use in the online classroom.

The other problems the teachers had in the creation and use of resources were not specifically because of the online nature of the teaching. Teachers teaching a new subject will always have to spend time gathering and judging the merits of resources prior to their use, and this is the case whether teaching online or conventionally. Similarly, if the resources have to be translated into te reo Māori for the first time, this is an issue whether teaching conventionally or online. The issue for online teachers was that they had these demands alongside that of planning and implementing online lessons. One wharekura was developing a Resource Development and Production Unit to be functional at the beginning of 2004. The purpose of this unit was to employ people to create and test "online learning ready" resources for use in the kura and to therefore allow the teachers to "concentrate on teaching".

The e-teachers suggested a database of resources suitable to be used in the online classroom be established. This initiative would serve not only to relieve some workload issues but also provide a basis from which to "grow" a knowledge base of resources for Te Kura Ataata. A common practice in most wharekura was to video online lessons and add these to their resource bank.

An example of knowledge sharing and curriculum development between e-teachers occurred with teachers at two of the wharekura we visited. Two e-teachers we spoke to were involved in the development of teaching resources in te reo Māori for a particular curriculum area. They were members of a teaching team that had been established by some wharekura e-teachers to plan and organise how to share the teaching load for this curriculum area. They managed this initiative through good communication but the team felt they needed more time allocated to this type of activity as they had to fit meetings around their other teaching commitments.

IMPLEMENTATION ISSUES

The teachers said that as the numbers of students increased in the online class there was an increased responsibility for the teacher because of the impact of working at a distance. There was more marking and more students to monitor and build relationships with "at a distance". The level of preparation required for online classes was also different:

> I have to think of implications that may occur 10 weeks from now, so that things are organised well in advance. I know you should be organised anyway but the offsite nature means there is an urgency to this. I have to have resources organised for the offsite students and I have to be flexible. Because you are dealing with at least two other school sites which you have no control over, things can happen which means they cannot come online and dates for assessments and all those things can change. (e-teacher)

One e-teacher posted work to all her students at least one month before it was time to do the assessments. When this teacher taught science online, she had to send out chemicals to the online students for practical work. She said that the time spent dealing with students by post accumulated over a year and represented a lot of "wasted time" in her opinion but she did not have another option.

Te Kura Ataata also influenced the nature of student assessments for the online classes in some cases. In some curriculum areas the assessments were emailed to the students, completed online by the students, marked online by the teacher, and then emailed back to the students. In other instances the students were posted an assessment activity by the teacher and when it was completed it was then posted to the teacher for marking, and returned to the student by post. This activity did have an impact on the school organisation as administrative procedures had to be put in place to deal with the logistics of posting information to students and teachers. In 2003 some wharekura were developing ways to manage this situation and employing administration assistants to support the online teacher.

Some e-teachers thought that the time allocated for an online lesson was not long enough and that there were insufficient curriculum-specific online teaching strategies to deal with this. Further,

technical problems impacted on teaching time and became frustrating for the teachers. For example, if the "connection" to the bridge was not working at the beginning of the lesson time, teaching time would be cut down further.

Another concern for some teachers was a feeling of insecurity about their language ability outside their own kura and concerns about the adequacy of their language with students from other kura and other teachers:

> Online teachers have to be very confident people as you can't monitor the attitude of the people at the other end. They have to be confident in their reo, their delivery, in their curriculum area and you have to trust that the people watching you are of 'good heart'. It's a tough one. (Principal)

THE TECHNOLOGY

The technology itself can further limit interactions between the teacher and the offsite students. Time delays in responses were frustrating for the teachers and the students, who were used to immediate feedback in a conventional classroom. One teacher said that it was difficult to respond to all the online students and that those who were in front of the online classroom or onsite were advantaged as they were more easily seen and heard and so were given feedback as requested.

Suggestions were made for technological changes, such as improvement in the sound quality. However, technological improvements are always occurring and these changes are brought to the online classroom eventually. The newly purchased bridge is one example of this.

When the teachers were asked if their use of the video conferencing format would change with time in terms of their delivery, student tasks, and interaction with students, they commented that they felt they were limited by the technology. The technology means that delivery is less interactive and demands a more lecturing style. They did acknowledge, however, that as their experience and confidence grew they could use more creative approaches. One teacher said that she learnt to provide as many visual images as possible rather than simply writing under the document camera. She was also keen to experiment with video programmes to her online students. One teacher said she "talks constantly" in her class as a way of overcompensating for the technology and the distance. With time teachers are beginning to "grow" into the online teaching model and improve, experiment, and change their practice. Perhaps eventually the technology will become less of a focus of the learning activity as other resources and supports are developed to enhance learning.

In 2002 we interviewed a principal who was also an e-teacher and who has used the First Class management system throughout his wharekura since August 2002. This software enables teachers, students, and groups within school communities to share ideas and resources and to collaborate. He saw this system as one way to have the students' reports online and to share resources and course material between wharekura. The teachers at this wharekura have seen the benefits of having their course material online, and are making it available to other wharekura. Administration staff at the wharekura also used First Class. The uptake of this system by other

wharekura has not happened because of lack of time for online teachers to continue their professional development, insufficient software knowledge, and server technical problems. While the primary purpose for providing First Class to online teachers was to assist in alleviating their workload, there are concerns about the ongoing cost of First Class for wharekura and this was alluded to in our 2003 interviews when we asked about the uptake by other wharekura.

Support for wharekura e-teachers

There was general consensus amongst the teachers that their work needed to be supported by providing assistants or support teachers to help with the management and administrative tasks associated with teaching online. They also saw a need for structures that enabled the community of e-teachers to help each other with professional and pedagogical matters.

SUPPORT TEACHERS AND ADMINISTRATIVE ASSISTANTS

Most of the wharekura e-teachers said that all online teachers should have a kaiāwhina (supporting teacher). The kaiāwhina could do a lot of the administration work, such as co-ordinating the mailing of information to offsite students and liaising with the offsite students. One of the teachers had a kaiāwhina and commented that it made a large difference to his workload stress:

> This allows the online teacher to continue in their role as a facilitator of learning, and modelling work for the students, rather than getting bogged down in the administration things. (e-teacher)

A source of frustration for e-teachers was the management of the online classroom when some kura did not provide a supervisor in the online (offsite) class. One teacher experienced students running out of the classroom or hiding during her first year of teaching online when there were no supervising teachers. Kura participating in Te Kura Ataata in 2003 were obliged to provide a supervising teacher.

The principals suggested that more staffing needed to be provided to support the e-teachers, and acknowledged that this could be provided by the Te Kura Ataata Grant. This support could be at the teaching or the receiving end, with the outcome to help relieve some of the workload and improve the quality of what can be achieved in terms of teaching and learning**.** One principal was very adamant that "a teacher's job is to teach" and employed people to be administration assistants to online teachers and set up a Resource Development and Production Unit for the coming year.

The principals were adamant that the extra workload of the e-teachers should continue to be recognised by the Ministry of Education and that ongoing government resourcing was required:

> There is no advantage in having our online teachers burnt out so we can't even offer a full curriculum. If this isn't sorted then it is like setting us up to fail, and this is not an option for wharekura. (Principal)

When asked about their role, the wharekura e-teachers considered it as an important one because they were teaching a larger number of Māori students, and therefore providing them with real educational opportunities. They regarded it as "hard work" and, for some, the support of the principal, other staff, and whānau was crucial in their continuation as an e-teacher:

> We really do help and support ourselves. I do need positive reinforcement that what I am doing is right. (e-teacher)

COMMUNITY OF SUPPORT WITHIN AND BETWEEN WHAREKURA

In some wharekura there was more than one online teacher and the support they received from each other in the form of advice and shared resources was very important to these teachers. In one wharekura one online class was taught by a team of three teachers, all from that particular wharekura. This offered the opportunity for interaction between teachers when they were planning and teaching. They shared the workload, design, and delivery of the course, and each taught one-third of the course. When they were not actively teaching, they sat alongside the students as a participant observer. This allowed the teachers time to reflect on their own teaching practice and also learn in the areas the other teachers were teaching, rather like a professional development course.

As the project continued, the group of e-teachers across the different wharekura were developing professional relationships with each other and this collegial support from peers fostered some sharing of curriculum resources.

In 2003 the e-teachers reported that after one year of video conferencing they were beginning to see how they could share resources. Initially they were so overwhelmed by the training and actual online teaching that they did not take the time to consider resource sharing. Some schools were videotaping video conferenced lessons. These tapes became a resource for the students to refer back to and also for other teachers who themselves may be training to be an online teacher in a particular curriculum area, or for a student teacher within the school. The teachers commented that over time the resource bank would definitely grow and become extremely valuable. Some teachers commented that being able to sit in on an online lesson was more valuable training and professional development than anything they had had previously.

The principals and the e-teachers commented that the development of a pool of wharekura e-teachers is important as they are a potential source of advice for other wharekura teachers. One suggestion was that when teachers are planning programmes for Years 9 and 10, they would be able to talk to e-teachers with particular subject content knowledge at senior levels about the sorts of areas they need to cover in their programmes. The principals saw positive outcomes for the online teachers in gaining collegial support not only within their own schools but also with their peers in other schools. They saw a strong, supportive community of wharekura e-teachers developing.

OTHER SUPPORT SYSTEMS

The KAWM co-ordinator for the wharekura cluster was one of the key people who supported the e-teachers. The co-ordinator contributed to the overall video conferencing programme by setting up hui with the participating wharekura at the beginning of each year and the beginning of subsequent terms in order to develop the timetable and plan other activities for the cluster. The co-ordinator also organised and facilitated professional development for the teachers. He convened hui with the wharekura teachers including online professional development sessions and meetings to discuss particular issues.

A further key player was the cluster ICT technician although many of the e-teachers were concerned that they often could not get the immediate attention needed and this impacted on time available for teaching. While most teachers recommended that each school has their own onsite technician, as some now do, others have also developed adequate relationships with offsite non-cluster technicians. Overall, after 3 years with KAWM, most wharekura had begun to work out how best to meet their technical needs.

The teachers said that the leadership provided by the principals for the whole KAWM programme impacted on how they coped as online teachers and, for many teachers, this filtered down also to professional and personal support from their principals:

> I would never have managed if (principal) hadn't been the person she is. She is able to let you do what you want to do, what you feel is tika but will say something and be there if she can see you getting in over your head, like I sometimes do with my students without realising that my family suffers. (e-teacher)

> You have to be reminded of the vision for our students' future and the person who does this more than anyone is our principal. As teachers we sometimes get too involved in minute details of teaching that we forget to see the big picture which does inspire us. (e-teacher)

Other issues relating to e-teachers

The e-teachers had a range of personal views about being e-teachers and teaching online. Even in the event that the workload issues for online teaching were resolved, not all wanted to continue being online teachers. Some did enjoy it and wanted to be only online teachers, others liked a mixture of both online and conventional teaching. Those who wanted to continue as online teachers felt they could make contributions to training further e-teachers. One of the teachers was adamant that "what she learnt on the job" about teaching her particular subject was more than she was ever trained for in preparation for teaching online, and felt her new skills would help new teachers straight off without them having to "experience it" first.

In both 2002 and 2003 some principals raised the possibility that some teachers might choose to only be online teachers, possibly contracting their services out to schools. This would mean that they would not have the regular interaction with pupils as they currently do within their own schools. When some of the teachers themselves considered this as an option they thought it had some appeal, but were unsure about taking the step outside the security of a school and guaranteed income. They were also concerned about how this would work if teachers had little or no

opportunity to build relationships with the students. The current practice of having hui where the online teachers and the online students meet could support the development of effective student-teacher relationships.

The impact of Te Kura Ataata on pedagogy

The principals we interviewed believed that there had been changes in the practice of online teaching within their wharekura over the 3 years of KAWM. Generally, the principals saw positive changes in terms of teachers' attitudes and their levels of confidence in online teaching**.** However, some felt this happened because of the "dedication and passion" of the teachers rather than through their participation in the training programme provided.

Some teachers who began their online teaching using a "lecturing" style made changes to the way they delivered their online lessons. They became more interactive in their approach and often tried to give tasks that were directed to individual students. For example, one teacher said he might give each student a particular focus in a topic and set specific outcomes for what he wanted each individual to achieve. Some teachers said it was more difficult to do group work with online students when they are not all at the same location, and so they spent a lot of time reworking group work for individual students. Another challenge was establishing and maintaining dialogue during class when the teacher could only check students' work by asking them what they had done but could not see their work directly. This was more difficult if there was no supervising teacher in the class. An ongoing concern for the e-teachers was giving sufficient attention both to online students and those in the face-to-face situation.

All the wharekura e-teachers we interviewed reported that the way they interacted with students in video conference classes had changed with time and as their experience in online teaching grew. It was different from conventional teaching mainly because the students were not physically present (because of the distance) and because they were not necessarily online for all the periods for that subject in a week. One teacher said she had to be more conscious to say everyone's names so students knew who she was, and, more importantly, so that students knew that she knew who they were. She said the teachers soon learned that "throwing out a question to the whole class was not an efficient use of time" so questions were directed to particular students by name.

Online teaching required not only new strategies to ensure effective teacher-student interactions but also new ways to build good relationships between students and the online teacher. An e-teacher's relationship with offsite students in the online class is different because they cannot "catch up in the playground":

> Teachers can become passive teachers because there are fewer opportunities to engage with the students. (Principal)

The teachers said that the interpersonal relationships they developed with the online students were important because of the distance factor and the frequency of contact time. One teacher said he had made an effort to become more interactive with his online students during the online class

over time. He realised that with limited contact time he needed to give the students every opportunity to ask questions:

> Sometimes you don't think you really know your students when they aren't in front of you in person. Last year we had a wānanga for all the students doing science and then we got to meet them face-to-face and that was important. In the future we need to do that earlier in the year. (e-teacher)

Another e-teacher was so concerned about having a relationship with her online students that she arranged weekend meetings with them throughout the year where mostly she travelled to them. This way she was able to meet the students' whānau as well:

> I just have to do it. If I don't have a connection with the student and even their whānau then I can't be an effective teacher. (e-teacher)

Most wharekura held hui or wānanga with the online teachers and students in order to develop and build their relationships and encourage a positive impact in the online classroom. The lack of whanaungatanga (relationships) between the online teachers and the online students was a reason specified by one principal for video conferencing not suiting their students in the first year of KAWM. The KAWM co-ordinator had an important role in organising these hui and they began occurring more frequently and especially at the beginning of the year.

The teachers all thought that the key sign of a good online lesson and teaching was the same as for a conventional class. That is, the engagement of the students, even though they, as online teachers, were not always able to gauge this with the offsite students. One teacher said that if she saw the students enjoying the class, if they constantly asked questions, and they did the activities, these were signs that the lesson was going well. The teachers relied on the feedback they received from the offsite students and the teachers supervising the offsite classes to help determine if the lessons were successful. Ultimately, they considered students passing assessments as the measure of success. One teacher commented that although online lessons went well most of the time, he was not convinced that online teaching should replace face-to-face teaching. He regarded this initiative as temporary until the pool of face-to-face teachers increased by whatever means.

Students' views of online classes

In 2002 and 2003 we interviewed six groups of students from five different kura (four groups in 2002 and two groups in 2003) about their video conference lesson experiences. The discussions with the students occurred in small focus groups and usually occurred after an online/video conferencing class.

What students liked about video conferencing

The students appreciated that the online classroom/video conferencing enabled them to broaden the curriculum areas they could study and gave them the opportunity to develop relationships with students and teachers from other wharekura.

In both years, students were mostly positive about video conferencing and enjoyed the experience. They enjoyed the teachers, and believed that they learnt a lot from their online teachers by video conferencing. The sharing of ideas and "whakawhanaungatanga" (building relationships) amongst the students and teachers at different sites was also important to the students:

> It was good to be able to establish relationships with other young people of other kura. (Student)

They said this allowed them to learn things from other students and about different schools that they may not have done without video conferencing. One student commented that they could communicate "with the whole of Aotearoa" via video conferencing. Some students had the opportunity to communicate with students in other wharekura on a more "semi-social" basis; for example, to engage in debating or drama, and on a "social" basis; for example, to talk about upcoming events such as kapa haka or speech competitions.

The students understood that video conferencing gave them the opportunity to learn subjects they would not be learning otherwise from other teachers and they expressed appreciation of that:

> If it wasn't for this video conferencing I wouldn't be able to do this work. (Student)

In 2002, students said they enjoyed the "different" nature of learning via video conferencing, particularly the technology, learning from another teacher, and learning with other students "from outside, but within the same classroom". It was "new and exciting" and the students looked forward to their video conference classes because they were different to their other classes. The technology engaged, or in their term "hooked", the students into the lesson and they paid more attention to what the teacher was saying. They were "aware" of the "other" students and this made them concentrate more because they did not want to be seen to be "slacking around". All the students said they knew how to operate the equipment in the classroom, and respected the value of the equipment. Often students were in charge of the equipment and the teachers regarded this leadership role highly.

The students we talked to in 2003 indicated that while the technology and practice of the online classroom was no longer "new and exciting", it was still an important and valid experience; that is, they needed to participate in order to access the curriculum area being offered.

What students did not like about video conferencing

The problems students noted about video conferencing lessons were either technical or concerned with differences regarding distance learning. In 2002, students said that the sound quality was not always high, and they had to concentrate to hear the online teacher. Students needed a secure and quiet room to prevent interference from outside sounds. Most wharekura were working towards improving these situations during 2003. Difficulties also arose when the video conferencing equipment did not work properly, and a few students commented on the amount of time used waiting for linking up to the system and the frustration this caused for both students and teachers:

> When we go online and if there are more than three kura linked up, we are not able to see everything and sometimes we can't even see the teacher. When we want to ask questions to the teacher, the screen changes and you can't hear. (Student)

However, this situation was alleviated for 2004 by the purchase of another bridge by the Ministry of Education.

Students also discussed the drawbacks of teacher-student interactions through video conferencing. Some students commented that it was better to have a teacher teaching "in person" than video conferencing, because the teacher can see their work and talk directly to the student at that moment in class. Others said they would do better in a face-to-face class because you can actually be shown things in class and ask the teacher more questions. They also said with a "face-to-face" teacher they can ask questions more often without "being shy" in front of the students from the other kura, and they have more social interactions, such as "catching up in the corridor". Although the online classes had a teacher "supervising" the class, often the supervising teachers were not able to answer the students' questions about the curriculum area.

Students' ideal scenarios for video conferencing learning

The majority of students said that both the video and conventional classes had advantages and they would like a mixture of both available in their weekly programme:

> I wouldn't go back to just having normal classes all the time as it gets too boring. With video conferencing at least it's a bit different. (Student)

> If you just had all your classes by video conferencing it wouldn't be good. You'd get frustrated because you would never have a real teacher to talk to about your work. (Student)

Most students thought, however, that the ideal would be to have an expert teacher face-to-face in a classroom. If this was not possible then rather than not be able to study a particular curriculum area, variations on the online classroom were preferred. In the online classroom the least preferred option was being an offsite online student in a classroom without a supervising teacher and only one online session per week with a teacher you have not met personally. Contrasting this, the most preferred online classroom situation was being onsite or well supervised offsite, with an expert teacher more than once a week with whom you have a relationship because you have met previously. The reality was that most students experienced a mixture of both these situations. Some students did not mind which type of class they were in because "in the end you gain the same knowledge so it didn't make that much difference".

We asked the students if they would move schools if they did not have the video conferencing option to study subjects, and they mostly said they would not move to another school, but commented that it depended on the particular subject and on what they perceived they needed the subject for. Some wharekura students did not have the option to move schools if they wanted to continue their education in te reo Māori.

Impact of Te Kura Ataata and the Wharekura Expert Teachers' initiative on the kura, local community, and the network of wharekura

The school

The major impacts on schools were in the areas of organising a shared timetable, providing supervising teachers for the online classes, and facilitating the whakawhanaungatanga (relationship building) hui (meetings) for the online students and teachers.

The shared video conferencing timetables used in the wharekura cluster in 2002 and 2003 impacted on the wharekura in a number of ways, and compromises often had to be made in terms of collegial and whānau practices. One impact of the shared timetable for the schools we visited was that it disrupted activities such as karakia, school trips, pōwhiri, and lunch breaks, and sometimes prevented online students from taking part in these activities because they had to attend their online lessons. The timetable also affected the way other classes operated because they had to work around the fixed video conferencing timetable. This had implications for the combinations of subjects that online students could take. However, most principals said they were prepared to work around the limitations of a shared timetable because they believed in the "kaupapa" of the online classroom.

A further impact on the wharekura programmes was in the provision of supervising teachers. The wharekura receiving video conference classes because they did not have a teacher for this subject nonetheless had to supply a teacher to supervise the online class and manage the operation of the valuable equipment. This effectively took a staff member away from another class and placed additional stress on the ability of wharekura to offer their students a full curriculum.

One of the six principals we interviewed commented that the video conferencing timetable did have the potential to impact positively on curriculum delivery in the school's other classes:

> Indirectly it gives collegial support to our kaiāwhina and teachers onsite because there's this expert teacher there modelling certain things and that's a benefit and a bonus. It supports our kaiāwhina to think about their curriculum delivery for their subjects, but I think too, we're lucky we've got reflective teachers here at our school. (Principal)

All of the wharekura e-teachers we interviewed believed that there needed to be "person-to-person" wānanga[9] with the offsite online students at least once a term. This view is based on the philosophy of Te Aho Matua in which the relationship the teacher has with the students is the prime relationship and is based on knowing the students' whakapapa. The teachers also commented that when you only see students for a few hours a week it is difficult to get to really know them or to gauge their progress. The wānanga that had occurred to date had been positive, and provided a happy environment for learning because the students and teachers had the opportunity for whakawhanaungatanga, that is, to build and maintain teachers' relationships with students.

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[9] A type of forum.

The community

While initially there was an intention to have the board of trustees and community use the video conferencing equipment, this was slow to develop. Schools were aware of the expense of the equipment and the skills needed to use it, and wanted to ensure policies and protocols for practice were put in place before this was to occur. All wharekura, however, expected this use of the equipment to occur in the near future and some had allowed whānau members to use the equipment for video conferencing meetings they have with people in other centres, and training for school trustees.

The provision of the Te Kura Ataata Grant to wharekura that have e-teachers increased the level of accountability for the board of trustees, and added new responsibilities, such as reporting to the KAWM co-ordinator and the Rūnanganui by video conferencing once a month, and submitting written reports to the Ministry of Education.

Building relationships between wharekura

A suggestion made after the first year of KAWM was that wānanga be held at the beginning of the year so the online students and online teachers could meet face-to-face prior to the online class beginning. This was seen as an opportunity to talk about the course, distribute textbooks and course outlines, and begin relationship building. This did happen in 2002 and again in 2003.

The principals reported the development of a "whānau of online wharekura" amongst the students and teachers. There were positive social outcomes for the students in establishing relationships outside their own schools.

Principals and teachers constantly looked for opportunities for the students to engage in via video conferencing. Examples of these were discussion sessions where the students were facilitated to discuss issues that concern them, debating sessions where the students debated policy across kura, discussion sessions about national hui outcomes, and broadcasting student news in te reo Māori:

> The students could run something like a student council across all the wharekura, and they could discuss policies to do with drugs and alcohol and so on. (Principal)

At national hui, such as Ngā Manu Kōrero, the kura reo, Ihumanea, and the National Kapa Haka Festival, many wharekura and Paerangi school students either already had a social relationship because of the video conferencing, or were able to build on the relationships developed because of attendance at the national hui, as part of the video conferencing programme. In 2003, the national Ngā Manu Kōrero hui was video conferenced to all the KAWM schools allowing the students at schools to support their friends, peers, and relatives participating at the hui in Palmerston North.

The laptops and ICT professional development

The aim of the Laptop programme was to provide every teacher in wharekura, including principals, with the personal use of a laptop computer with the requirement that they participate in

a professional development programme. The purpose of the programme was to build teachers' fluency in the use of information and communication technologies, particularly the computer and the Internet. By participating in this programme the teachers were able to learn how to use the laptop as a tool to reduce their workload and thus give more attention to teaching. Some teachers who were participants in the Te Hiringa i te Mahara ICT professional development programme were not eligible for the KAWM programme because they already had access to laptops and professional development. It was the experience of these teachers with Te Hiringa i te Mahara that signalled to the principals and other teachers that this aspect of KAWM would be of benefit to them.

Involvement in the Laptop programme

By 2003 a total of 116 teachers from the wharekura had participated in the ICT laptop professional development programme. In our research during 2002 we interviewed eight laptop teachers who were participating in the programme. In 2003 we interviewed seven laptop teachers.

The teachers had the use of the laptops for 2 years and at the end of this time some teachers were able to buy them off the school while others were in a leasing arrangement with a commercial company. The teachers found this a "messy" aspect to the programme.

Laptop professional development

The laptop training involved hands-on workshops and online tutorials (a 13-week series of 2-hour sessions, using audio conferencing). While the duration of the programme was 2 years, once the online tutorials were completed after 13 weeks, the teachers did not have any further workshops or audio conferencing sessions. However, they were able to contact support people during the remainder of the time.

Impact of the KAWM Laptop programme on teachers and teaching

Most of the teachers commented that although the initial commitment to the programme was stressful mainly because of the time commitment, once they had completed the programme, their abilities and skills with the laptop helped them manage their workload better. They said that once the weekly commitment was over, they were able to see the value of the skills they had learnt.

Administration and lesson planning

The laptop allowed teachers to reduce their stress and spread their workload better because, for example, they didn't have to stay at school to use the computers to complete administration tasks and lesson planning.[10] All the teachers we interviewed said they used their laptops every day at

[10] Approximately half of the teachers did not have a computer at home.

school and most used them at home or at hui 2–3 times per week. All the teachers used their laptops to gather resources from the Internet. The teachers said that while the laptop was not often used in class as a teaching tool, except by those using it for PowerPoint presentations, it was a tool that helped them get work done, by allowing them to plan, research, and communicate. They mainly used the laptop as a word processor, for both administrative tasks and tasks to support teaching in the classroom. Teachers commonly used their laptops to develop unit plans or create worksheets and templates. They had all learnt about PowerPoint but less than half had done a presentation in their classroom. The main reason for this was the lack of equipment such as a data projector.

All teachers said there were changes in the way teachers presented their resources; for example, they were of a higher quality and often they were published and laminated. The teachers also thought that producing their own resources was more cost effective in some cases than purchasing from outside agencies. One teacher said it had helped him to expand on his own professional development in areas such as research, and to develop his own te reo through having access to more te reo Māori resources. Another teacher commented that:

> Because there is such a lack of resources in te reo Māori in kura most of the time you have to make your own or download material from the Internet, this work can continue late into the night but at least with the laptop this can be done in the comfort of your home.

Teachers thought the laptop professional development programme had given them a tool to enable them to share resources. A database had been published with all the wharekura teachers' email addresses. They used email to link up with teachers around the country to distribute resources for wharekura. They also shared information about curriculum issues, such as NCEA, and extra-curricular issues, such as kapa haka and manu kōrero.

Classroom use

In 2002, wharekura teachers said they were still becoming confident in using their laptops in their classrooms, however by 2003 most were feeling very confident in their ability to use the laptop. There were still some teachers who were limited by Internet access and lack of computers in their classrooms and who were loathe to "share" their laptop with the students. The laptops had become an important tool for some e-teachers, particularly those who taught computing.

Networking

While email was seen as a great communication tool, its use varied between teachers. A few wharekura teachers hardly used it to communicate with colleagues at their own school with the preferred method of communication still being face-to-face. Some wharekura teachers used email to communicate with colleagues outside of their school, with other wharekura teachers, or with parents on a regular basis, although most teachers used their laptop to write panui or notices to parents. Only one wharekura teacher we interviewed used their laptop to communicate with the wider school community as she was a staff representative on the board and used her laptop to send

messages to board members. The teachers commented that of course email communication is limited to those people who have email access.

Technical issues

Some of the problems experienced initially by teachers within the programme included technical problems with the actual laptop and situations such as the lack of ports for Internet access in schools. These issues were less evident in 2003.

Related issues

All the principals commented that the Laptop programme had made a big difference to their staff. They thought the staff had more confidence and skills, enabling them to do more things more efficiently. The principals said the networking had continued to support the staff and "keep them buoyant" since the intensity of the weekly training sessions stopped:

> What has happened in our kura now is that the primary teachers want laptops, and I don't blame them when they see what the wharekura teachers can do. (Principal)

One principal said they had taken the laptop initiative a step further and purchased two extra laptops for the administration office. They were connected to the kura Intranet along with the teachers' laptops, and this made a positive impact on some administration tasks, such as completing student reports. Some principals said that completing student reports online has been simplified for the teachers and the administration staff because of the network.

The impact of the KAWM Laptop programme for students

Teachers believed there was a positive impact on students as a result of teachers' use of laptops in the classroom. In some cases the teachers said they gained respect from the students because they were more confident with the use of ICT and the students could see this. Some teachers commented that a positive impact of the laptop training was that they could discuss and explain things about using computers to their students; for example, using PowerPoint, accessing the Internet, showing how to use a special function of Microsoft Word. For one teacher the laptop training enabled her students to build relationships with students from other kura through email communications and video conferencing. Other teachers commented that the laptop and the training had a positive impact on their students because it had brought them closer to being a part of "their world". They believed it was important when communicating ICT-related ideas to their students that they understand what they are talking about. The teachers commented that the laptops and the training have been very helpful for both students and staff because the students get the benefit of having better-presented lessons by the teachers, they get access to more resources, and they get support from their teachers in presenting reports and assignments. Teachers and students commented that they want more use of ICT in their "every-day, every-period" classes and would like to see the "taster" they have been offered with teachers having laptops in their classes extended by the provision of more information and communication technologies.

The impact of the KAWM Laptop programme for schools

One of the major impacts for schools with teachers participating in the Laptop programme was the administration of the equipment. The laptops are delivered to schools, distributed to teachers, and contracts have to be signed. Over the 3 years of the project, schools developed processes and protocols to manage this. However, the change in laptop schemes (to STELA/TELA) also impacted on the administration load for schools.

While KAWM provides professional and technical support for teachers, many schools have realised from their experiences that they need a staff member to provide onsite support for teachers and to co-ordinate the KAWM ICT initiatives. One of the kura has two staff members who provide onsite technical support for teachers and co-ordinate the KAWM ICT initiatives in the kura. The principal of this kura commented that this has had a major impact on reducing the workload of other staff in the kura.

The school-based ICT infrastructure

This aspect of KAWM involves the provision of "thin client" networks in all the clusters, using a powerful server in each school. The wharekura cluster received 430 computers (a ratio of one computer to every three students) and received financial assistance to set up the cabling infrastructure.

One of the reasons wharekura were provided with the networks was to support the online classroom by providing the mechanism to transfer files between teachers and students.

The principals had a range of different experiences in the installation and subsequent implementation of the network in their kura.

Installation

In one kura it took only a day to get everything set up. This kura said that one of the main reasons why they did not have many problems was they had weekly technical support, when the technician checked the equipment in an attempt to avoid possible problems. This was not a service that responded only to requests from the kura to fix a problem, but one that was proactive in maintenance of the equipment.

In one kura the implementation of the network was not satisfactory. In 2002 the students from Year 9 up were transported to another site to use a computer lab once a week. This was for 1½ hours a week and the students were only able to be assessed for one unit standard a term. The connection to the Internet could not be guaranteed, and if it was important to do so, the staff would have to go to the principal's house to use the Internet:

> The computers have been a nightmare, they aren't all installed and connected. There is no local support, the students forget their passwords and they can't find their files. (Principal, 2002)

In 2002 one principal commented that the cabling and installation was successful in his kura, but there were a number of issues that needed to be addressed before the kura could fully reap the benefits of the network system. These included student passwords, backup schedules, student Internet access protocols, and hardware repairs. He was concerned that there was a lot of technology in the kura that students could not use because of these issues. He said that it was a big responsibility for kura and, in the case at his kura, there was no paper trail regarding the equipment and he was worried about potential problems with auditors. He suggested that more robust systems be put in place to ensure the processes are clear, including the process of technical support provision. He was concerned about the instability kura have felt about the future funding of programmes such as this, and questioned the management of the project, suggesting that the Rūnanganui manage the project:

> Our technical support has improved but I think it might have to do with how vocal I am about it to the powers that be. (Principal)

By mid 2003 all installation was complete.

Implementation

All the principals commented on the potential of the network for the students and teachers. Some saw an increased use of the technology, mainly in the areas of word processing and Internet access, by both teachers and students. The teachers who had laptop training used some of the skills they learnt to support their teaching, such as producing resources and making them available on the network for students to directly access. The principals commented however that teachers needed more training about how to integrate the technology into their teaching. The principals were all looking for pedagogical changes in the classroom and were positive that this would happen in the future.

When asked about community use of the equipment, principals said this was an area that was underutilised but that there was great potential in the future. One principal said in 2003 that the kura and the staff were only just becoming familiar with the equipment themselves. They realised that training would be needed for community participation and they were not sure who would have the responsibility for this. The principal considered this an issue for the board of trustees to deal with. However, he was wary about the staff being asked to carry out the training and supervise the use of the equipment. Some principals said that some whānau used the school computers as a word processing tool to carry out board of trustees' work such as writing minutes and preparing proposals for funding.

All the principals said the attitudes of most of the staff and students towards ICT were positive before the KAWM initiative, and continued to be positive. Some staff were not so positive because they lacked confidence in the use of the equipment and this improved once they received training. Staff generally had become excited about the initiative and this had also impacted on

students. Some principals commented that students were more capable than some of the teachers with the use of the computers.

Overall, principals considered the KAWM project, including the network system, as a positive initiative for kura, despite technical problems:

> The advantages far outweigh the disadvantages. (Principal)
>
> Our experience we have now needs to be used to advise and prepare other schools who want to embark on this type of ICT initiative. (Principal)

ICT in teaching and learning

Classroom use of ICT in 2002/2003

In 2002 we did not gather detailed information on the use of ICT by the students in the wharekura, as the schools primarily focused on the implementation of aspects 1–3 of the KAWM project (online classroom, Wharekura Expert Teachers' initiative, and the laptop and ICT PD). However, in the three classes we observed in 2002, the teachers and the five students we spoke to indicated that the use of ICT was valued and beginning to increase. The students and the teachers were excited about having access to the computers and while they "weren't doing anything really fabulous in class" they were keen about the future possibilities of use:

> We are doing basic word processing at the moment with most of our students but we can see that once we get the basics covered we will be doing more exciting things for the students, such as, letting them use the Internet for research and that sort of work. We can see that it will be great for the senior students. (Teacher)

In 2003 we observed six ICT-related classes. The students we spoke to all used computers at least three times a week. All classes we observed were using ICT with the most common uses of the computer being word processing to write assignments and completing research on the Internet. Two of the classes were completing assignments about the Māori prophet T.W. Ratana and the Ratana movement and two classes were completing assignments about the establishment of Te Kōhanga Reo. One class was using the Internet for research to complete unit standard tasks for history and another class was using ClipArt to make Father's Day cards and certificates.

Although no classes were observed using multimedia equipment, one teacher said that the new multimedia equipment acquired in 2003 was used as often as possible (i.e. at least every week), for example, to produce videos of students making oral presentations for assessment. Another teacher used the new multimedia equipment to show students how to use the digital camera and how to present their work in different ways by incorporating photos alongside text.

Students' experiences of classroom ICT use

In 2003 we spoke to six groups of students who had ICT-related classes. When we asked about their lessons using ICT, the students acknowledged that the computers gave them easy access to information they needed. The students studying about Ratana said that the motivation for the lesson was they enjoyed learning about the topic itself rather than the computer *per se*. They enjoyed learning about something that was relevant to them and that they could relate to. They said, in this case, that the computer was valuable to them as a tool:

> The best thing was learning about Ratana Pā because it is said that this is a good place and it is good to know and understand the things that are said (about the pā). (Wharekura student)
>
> The best thing I liked about this lesson was going on the computer to learn about the history of Ratana because the wharekura is going to Ratana Pā, 'ka tū pakari ahau nā te mea I mōhio pai ahau ki ngā ahuatanga'. (Wharekura student)

The Year 10 students who were using the computers to write an assignment about the establishment of Te Kōhanga Reo also talked about how interesting they found the kaupapa of the lesson. As one student said, the best thing about the lesson was:

> …the kaupapa and learning about things Māori people have done about Te Kōhanga Reo. (Wharekura student)

Similar comments were expressed by Year 11 students who were accessing information on the Internet to complete unit standards tasks for history:

> The best thing was learning about te ao Māori, about the Treaty of Waitangi, whakapapa, te reo rangatira, whakatauki, mōteatea, pōwhiri me era atu mea Māori (and other things about Māori). (Wharekura student)

Although students talked about what they were learning in their lessons, clearly the activity of searching the Internet contributed in a significant way to their enjoyment of the lessons. The students said that having access to information on the Internet helped them with their work and they particularly enjoyed finding new information.

A small proportion of students made negative comments about these classes. These comments were either about difficulties they encountered related to their skills in using the computer or to their misunderstanding of the subject content. Sometimes they felt less motivated because of the way the classroom activities were organised.

There were 23 students across all the groups we interviewed. Seventeen of the students believed that researching on the Internet was the most useful thing about using computers in class. Fifteen students said that using the computers was helpful for presenting their work because they could type their essays and letters and they looked better. Twelve students said that using the computers was valuable because they could save their work and go back and finish it at a later time, especially when they could not finish assignments in one lesson. Some of the "best things" students said they had done on computers in class recently included: emailing friends, finding

information on the Internet, downloading songs off the Internet, making PowerPoint presentations, incorporating music into their PowerPoint presentations, and making web pages.

A number of students commented on some of the frustrations of using computers in class. For example, seven students mentioned the computers were slow, especially when they crashed and had to be rebooted. Rebooting the computers could take between 10–15 minutes, which was a lot of lost time for a 40-minute lesson. Logging onto the computers could also take time.

The majority of the students we interviewed believed that if the computers were taken out of the classroom it would make a difference to their learning. The main differences would be not having access to a word processing function and the Internet. Six students said it would probably make things a bit harder because they would have to do everything by hand and would have to go to the library. Two of these students said it would make a difference because they do most of their work on computers for Bursary. Five students said it would be harder for them to do a lot of their work because they did not have a big library at their school and without Internet access they would not be able to carry out research as they currently do.

Most of the students we interviewed agreed that using computers in the classroom was going to help them in the future. Some of them said that this was because knowing how to use computers was going to help them get jobs when they finished school.

Summary

Te Kura Ataata and the Wharekura Expert Teachers' initiative

- The primary reason wharekura principals participated in Te Kura Ataata and the Wharekura Expert Teachers' initiative was to meet their immediate need of delivering a full curriculum to their senior students. It was also acknowledged that the online classroom provided a networking opportunity for wharekura teachers and students.
- In 2002, Te Kura Ataata offered six subjects to wharekura and in 2003, eight subjects.
- While there were a number of challenges in implementing the online classroom, principals, teachers, and students we interviewed believed that the value and benefits of Te Kura Ataata far outweighed the barriers.
- Te Kura Ataata enabled wharekura to offer their students a diversity of subjects and was viewed as the best option for providing some resolution to the issues of skilled te reo teacher shortages in various subject areas.
- Principals were taking a cautious approach about the overall outcomes for their students.

Implementation issues

- The initial implementation issues included developing a shared timetable between participating wharekura, the fragility of the technology, the workload that fell on the e-

teachers, and the staffing impact of needing to provide a supervising teacher for offsite students.

- The appointment of a part-time KAWM co-ordinator in mid 2002 provided the mechanism for developing a shared timetable and for promoting ongoing professional development of staff involved.
- Over time the stability and quality of the technology improved and the new bridge that was due for installation from the beginning of 2004 was expected to provide additional support.
- Extra funding provided by the Ministry of Education to support the e-teachers and Te Kura Ataata helped alleviate some of the strain placed on these teachers.

Learning to teach online

- The e-teachers found that online teaching differed from conventional teaching in a number of ways. They needed to plan ahead more in their preparation to allow time to distribute resources. The lessons needed to be more structured to account for the technology and distance, and resources needed to be modified so that they are appropriate for the context.
- Teachers also needed to develop new ways to give students feedback, both during the lesson and through assessment. The students and the teachers missed the immediacy of person-to-person contact outside the classroom.
- The schools found value in having hui for Te Kura Ataata at the beginning of the year to enable the online teachers and students to meet and establish relationships and some e-teachers have arranged meetings during the year. Hui of this nature are seen as critical in developing the relationships needed for teachers to be able to effectively support their students' learning.

Being an online student

- In general, students appeared appreciative of the opportunity to study a wider range of subjects through the online classroom. The need for a supervising teacher was recognised, as was the importance of meeting face-to-face with the online teacher.
- Students acknowledged the impact of Te Kura Ataata in enabling relationships between students attending different wharekura.

Workload issues

- There were a number of ongoing workload issues for wharekura e-teachers and strategies being used to address these included providing a person to manage the liaison with the offsite students and support in resource development and production.
- There was a growing trend towards shared resources between e-teachers. There is the potential to exploit this further, for example by establishing a database of resources suitable to be used in the online classroom, but at the time of the evaluation there was insufficient technological capability in most of the schools to realise such a development.

- Other continuing issues are timely technical support for maintaining the equipment and problem-solving and professional development for e-teachers tailored to particular curriculum areas.

The laptops and ICT professional development

- The personal use of a laptop computer and the associated professional development enabled teachers to plan, research, and communicate more efficiently.
- Teachers were able to access resources and assessment tasks online, create and share resources, communicate using email with a network of colleagues, plan and write lessons at home, and accomplish a range of administration tasks efficiently.
- It was felt that initial training should be followed by opportunities to extend the teachers' use of ICT within the classroom context.
- The teachers had begun to use their laptops as a classroom resource in limited ways, such as providing opportunities for students to access the Internet and use the word processing function.
- The laptops led teachers to become more comfortable with information and communication technologies generally and therefore they are making more use of the school ICT resources. However, teachers and students commented that this needed to be taken a "step further" to realise the full potential of the laptops and ICT in their classes. There were indicators that some teachers were beginning to share ideas and resources between kura.

The school-based ICT infrastructure

- Despite a number of technological problems in both the installation and implementation phases, the ICT infrastructure in the kura visited was providing support for administrative and professional tasks.
- In order to sustain the various components of KAWM in kura, principals argued that there needs to be ongoing government funding, as they cannot manage on their current budgets. The funds would particularly be for the provision of the KAWM co-ordinator and the technical support.
- In order to make the most of the developments that have occurred, and to realise the full potential of KAWM, it was felt that ongoing professional development for teachers was necessary, particularly in relation to ICT use in the context of their specialist curriculum areas.
- While frustration was expressed by some students about technical hitches using networked computers within the classroom, most made positive comments about the opportunity provided to extend the nature of their research activity, to present their work well, and to improve the quality of their work.

Section Three

Paerangi Māori Boarding Schools

Introduction

There are six Paerangi schools, all situated in the North Island. There are three in one provincial region, two in another, and one in a city. They are the traditional Māori church boarding schools and have a long history in New Zealand. While traditionally the schools were all single-sex, two of the six schools are now co-educational. There are three girls' schools and one boys' school. The size of the schools ranges from 100 to 185 pupils.

The Paerangi schools' cluster is involved in three aspects of KAWM:

- Te Kura Hiko (the online classroom using video conferencing);
- the laptops for teachers and associated professional development; and
- the school-based ICT infrastructure.

On the advice of the Paerangi schools' principals, we chose three schools for our sample. The sample included two rural schools and one city school, one co-ed school and two single-sex schools, and two schools that provided online teachers.

We visited the three sample schools in this cluster in 2002 and again in 2003. The table below provides information about the interviews and observations we carried out on these visits.

Table 4 ***Interviews and observations in Paerangi schools***

School ID →	***PAE 1***		***PAE 2***		***PAE 3***	
Research activities/participants ↓	***2002***	***2003***	***2002***	***2003***	***2002***	***2003***
Principal	1	1	1	1	1	1
Laptop teachers	1	2	2	1	2	2
Online teacher	1	1	-	-	1	-
Online supervising teacher	-	-	1	-	-	1
Online class observation	1	1	1	1	-	-
Online students	4	-	4	3	4	3
ICT teacher	1	1	-	1	1	2
ICT students	4	4	2	2	4	8
ICT class observation	1	2	1	1	1	3

In 2002, we also observed an online hostel meeting and an online Paerangi principals' meeting and interviewed the principal of one of the Paerangi schools who did not participate in KAWM at the beginning of the project.

Te Kura Hiko (the online classroom using video conferencing)

As with Te Kura Ataata, the aim of Te Kura Hiko is to provide a solution for the Paerangi schools in their aspirations to deliver a full curriculum to their students. The Paerangi schools are small secondary schools that have difficulties offering a full curriculum range to their students because of their size. While Te Kura Ataata uses te reo Māori for delivery, Te Kura Hiko can be in English or te reo Māori. Also, Te Kura Hiko is not supported by an e-teachers' initiative.

Reasons for getting involved in Te Kura Hiko

Similar to wharekura, the three Paerangi principals interviewed were keen to participate in the KAWM project to increase their capability in delivering a full curriculum to their senior students. The small number of senior students (Years 11–13) means that some Paerangi schools cannot afford to have teachers teach in some senior curriculum areas, such as music, art, and the sciences. Some Paerangi schools are unable to attract staff who can teach at all levels and this impacts on the teaching capability at the senior levels:

> This project gave us direction as a school in the retention of our senior students. We can offer more subjects and continue to expand in ICT, especially now that The Correspondence School is on board. (Principal)

One principal said that the opportunity to video conference provided the school with a niche from which they could market their school "with the world at our doorstep". This reflects their stated commitment to using the equipment to enhance and maximise the education of their students. This school has been involved in video conferencing to other countries since 2001 and has most recently participated in link ups with students in Connecticut and New York.[11]

The principals commented that the whole KAWM package was an added incentive to participate, as they got the video conferencing equipment as well as the laptops for the teachers and the ICT infrastructure. Many of the Māori teachers at the Paerangi schools were already participating in the Te Hiringa i te Mahara project. The principals saw positive outcomes of this project, including upskilled and confident teachers and an increase in the use of technology in the school. They also saw the opportunity to gain more equipment and training for their teachers by being involved in KAWM. One school in the sample was already participating in a trial of video conferencing with The Correspondence School.

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[11] Article in *New Zealand Education Gazette*, 1 December 2003, p. 10.

The principal of the school that initially decided not to participate in the KAWM project saw the value of the project in terms of providing a "fuller" curriculum. However, the school did not take up the initial offer because it felt the project organisation, including information about its resourcing, was inadequate, and they did not want to be set up "to fail". In planning for the future of the school, the principal wanted to be sure the "opportunity was to become a reality". Having observed the first 2 years of operation in other Paerangi schools, this principal expressed a willingness to participate in the future and the school did so in 2003.

The principals also saw participation in the KAWM project as an opportunity to extend existing relationships between the Paerangi schools. The Paerangi schools have a tradition of meeting once yearly to participate in sports, debating, drama, and social events. Some of the schools, located in the same region, had also participated in kapa haka events together, and some had long traditions of sporting events before the establishment of the Paerangi Runanga.[12] These relationships were extended, and included some wharekura, because of the video conferencing facilities.

In 2003 the principals believed that the original reasons they were keen to participate in the KAWM project were still valid. One commented that they were committed to KAWM because they could see the potential of the initiative, although they believed that it was not yet making a difference to student achievement. The schools were just beginning to realise the opportunities the equipment could afford them such as the video conferencing of the Ngā Manu Kōrero hui. Some schools purchased additional equipment to complement the equipment they already have, such as multimedia equipment. This equipment was used with the video conferencing equipment and students were able to make films using video. One Paerangi school set up a film-editing suite in the video conferencing room and was also planning to develop a rūmaki (te reo Māori immersion) radio station at the school in 2004. This school was also exploring the possibility of linking their various boarding houses by video conferencing.

Use of Te Kura Hiko in 2002 and 2003

The number of Paerangi schools participating in video conferencing over the 3 years was consistent, with five of the six schools participating in 2001 and 2002, and all six participating in 2003.

All three schools in the sample had students participating in Correspondence School online courses using video conferencing during 2002 and 2003.

When asked about the high uptake of Correspondence School courses, principals commented that once The Correspondence School began to offer video conferencing courses they "jumped on board" to take this opportunity, particularly as this does not impact on their own teaching staff. While most of the principals would like to see more Paerangi teachers teach online, they were

[12] The Paerangi Runanga was set up in 1997 and consists of representatives of each Paerangi school. One of its aims was to look at ways to provide support for the continued success of the Paerangi schools.

aware of the issues confronting e-teachers such as the lack of pedagogical content in the training programme, the workload, and online resource development that had yet to be adequately resolved. However, their experience of Te Kura Hiko proved more satisfactory than they originally anticipated. One principal said they were finding that a combination of direct interaction with a teacher once a week (synchronous communication) and indirect interaction by sending in completed work (asynchronous) provided a learner-centred education that worked well with the students; that is, they enjoy it and they complete more work.

Working through the challenges of Te Kura Hiko

Timetabling

Te Kura Hiko had a large impact on the school organisation for each of the Paerangi schools. A shared timetable was necessary in order to facilitate video conferencing in a number of different sites.[13] At the beginning of the first year of the project the Paerangi principals (as the leaders of KAWM in their schools at that time) attempted to draw up a shared timetable. They found it difficult to develop one that suited all, partly because it was a new concept and they did not know what to expect or what was required, but also because they did not have the time to dedicate to the co-ordination. These experiences led the principals to pursue the idea of a person being the KAWM co-ordinator for the Paerangi cluster of schools, in the same way that the wharekura principals also realised such a position was necessary.

During 2001, because the Paerangi schools are boarding schools, the online classes were held after school for 2 hours in the evening. This could not be sustained by the teachers or the students, who were all having a normal full school programme during the day. The low participation of the Paerangi schools in 2002 reflected the demands of this approach. This experience led to the insistence that all online classes were to be held during the "normal" school day. Again, this was a decision similar to that made by the wharekura.

In 2003, one of the schools had a separate video conferencing timetable (primarily for students studying Correspondence School courses) running independently from the rest of the school timetable. This involved 10 subjects (Year 13 calculus, chemistry, economics, history; Year 12 accounting and economics; Year 11 accounting, agriculture, nutrition, and economics) and 17 students. This meant that students were coming out of "school-timetabled" classes, sometimes half-way through a lesson, to attend video conferencing classes. The principal commented that this movement during classes was disruptive, but was something they were prepared to do to support the students and KAWM, particularly with relatively small numbers of students affected. However, if the number of students having video conferencing classes increased dramatically, then the practicalities of this arrangement would have to be reconsidered.

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[13] See Appendix D for an example of a 2003 timetable for one of the Paerangi schools participating in video conferencing.

Staffing

The requirement to provide a supervising teacher for online classes impacted on school organisation. This effectively took a staff member away from another class. Again, like the wharekura, the staffing problem, which in some cases initiated the need for the video conference classes in the first place, was exacerbated.

In 2003, one Paerangi school appointed a member of the senior management team as the video conferencing co-ordinator to manage the online classroom onsite. This person liaised with the KAWM co-ordinator regularly and provided a "base" for the online classroom.

In order to encourage student use of the online facilities the principals organised times over lunchtime where students could meet with each other online in a social context. The uptake of this was variable depending on the availability of staff to supervise and the time of year. The need for a supervisor in the video conferencing room during these times depended on the students who were present, their skill in using the equipment, and their maturity. Supervisors were aware that their mere presence could alter the interactions between the students. One principal insisted that the students were supervised during these chat sessions and was pleased with their social development in this context. It was noted by the principals that immediately after the students had the occasion to meet in person, for example at a national hui such as Ngā Manu Kōrero or kapa haka festivals, the use of the online facility increased.

Technology

Teachers and principals were concerned, as were the wharekura, that there were limitations with the equipment; for example, only three schools could be accommodated on the bridge at any one time without causing technical difficulties during the first 3 years of the project. This situation impacted on the decisions made when planning classes:

> It seems silly that the technology that is supposed to improve things for our students is actually limiting them as well. (Principal)

As indicated earlier this concern has subsequently been addressed by the decision by the Ministry of Education to purchase a new bridge in 2004.

The KAWM co-ordinator

The appointment of the KAWM co-ordinator for the Paerangi schools' cluster in mid 2002 was a major step towards streamlining the KAWM organisation in schools and relieving the pressure of the principals as the KAWM leaders in their schools:

> The co-ordinator is probably the one person we couldn't do without at this point in time. She has made a tremendous difference to how we manage the whole KAWM project. (Principal)

The co-ordinator was paid by the Ministry of Education and key tasks included co-ordinating the shared online class timetable and the sharing of equipment (other than video conferencing

equipment such as multimedia gear) between the cluster schools. As with the wharekura KAWM co-ordinator, the Paerangi schools' co-ordinator position was half-time.

Planning for the development of a shared timetable began in mid 2002 when the co-ordinator was appointed. This meant schools had to plan well before the end of 2002 for the courses they would provide in 2003. The co-ordinator asked all the cluster schools to indicate the curriculum areas where they were prepared to provide an online teacher and to indicate the curriculum areas they would like an online class offered to their school. This was done early in Term 4 to allow schools to consult with their senior students and teachers. The co-ordinator also liaised with The Correspondence School. This also allowed the online teachers for 2003 time to plan for their work. This process was also to be followed again in late 2003 for 2004. This resulted in schools reviewing their capability and capacity to offer video conference classes as well as to supervise The Correspondence School classes, but also they began to realise the value of the "system" they were currently using with The Correspondence School and how it was "suiting them".

The role of the Paerangi schools' KAWM co-ordinator was also to liaise between the schools in the cluster and with the technicians, project manager, and outside agencies. While the role was similar to that of the wharekura cluster co-ordinator, in this case the co-ordinator was responsible for a cluster of schools that included all the Paerangi Māori boarding schools and also three wharekura that were located in the same region as the Paerangi schools. The decision to cluster in this way was made to allow for the more efficient use of the equipment and they did not share the online classrooms. The current Paerangi KAWM co-ordinator has full responsibility in her school for the KAWM project, as well as other ICT programmes in the school such as the Te Hiringa i te Mahara programme, and is supported strongly by the principal. The earlier experience as the hub-school co-ordinator for a cluster of schools involved in the Te Hiringa i te Mahara programme provided some advantages as it meant that the KAWM co-ordinator was very familiar with the equipment, the requirements and expectations of a co-ordinator, and the cluster concept.

The KAWM co-ordinator was also an online teacher, so she was aware of the impacts of being an online teacher and could support her colleagues. Apart from moral support and encouragement, she was able to offer practical advice about the amount of preparation and monitoring time needed when dealing with offsite students. She was also able to provide some "handy hints" for inside the online classroom, such as making sure "camera pre-sets" are set before the class. When a new art teacher began teaching at her school she looked for computer graphics software for the staff member to support her teaching.

The co-ordinator said that one of her roles was to organise virtual fieldtrips and to make contact with learning opportunities outside the schools, such as at the Rotorua Museum. She considered this to be an aspect of video conferencing that was underused, but was aware that the online teachers' workload may have prohibited their use of such resources. The co-ordinator also saw her role as seeking out curriculum options that could not be met by online teachers within the cluster, such as liaising with tertiary institutions for the provision of te reo Māori courses.

There were a number of "spin-offs" for the school where the co-ordinator was located. The co-ordinator organised and facilitated professional development with teachers at her school, such as the "international driver's licence in computing". The incentive for teachers to complete this course was the opportunity to gain a qualification on completion and it was funded by the school and teachers themselves.

The KAWM co-ordinator contributed to the writing of a video conferencing handbook for The Correspondence School based on her experience in trialling The Correspondence School video conferencing facility. The principals and teachers said the skills needed by the KAWM co-ordinator include teaching skills and experience, technical/ICT skills and experience, and a passion for ICT development in schools.

In our interview in 2003, the co-ordinator commented that the role was continuing as it had during 2002 and was significant to the continued success of KAWM in the Paerangi schools. In her words "it is more than a full-time job".

The online/video conferencing teachers in Te Kura Hiko

While the wharekura cluster had the Wharekura Expert Teachers' initiative linked to Te Kura Ataata, the Paerangi schools do not have a similar teacher initiative linked to their online classroom. However, an increasing number of teachers in the Paerangi schools have been trained to teach by video conferencing and over the 3 years of KAWM there were two teachers (of music and computer studies) teaching to other Paerangi schools.

When we interviewed the teachers they provided information that was consistent with the information we gained from the wharekura e-teachers about being an online teacher but located it within their own context. As might be expected, issues around the use of te reo Māori were not as major an issue for Paerangi schools as they were in wharekura.

Training

The number of Paerangi teachers who have participated in training to teach by video conferencing has increased. This training was provided by a private training provider called ASNET and funded for the teachers by the Ministry of Education. ASNET supplied the video conferencing equipment to all schools and undertook the training aspect as part of their services within KAWM. The teachers said the training for the online teachers in a 3-day session was not enough on its own. Each teacher who "passed" the training session received a certificate, but those teachers who did not have an "ICT bent" found it more difficult, because of the jargon used and unfamiliarity with technology. The teachers saw the need for follow-up sessions once they had had some experience teaching online, and time to talk about online teaching strategies, perhaps to provide a resource packaged as "handy hints for online teachers".

One teacher new to a Paerangi school was trained in the first half of 2003 and received only 1 hour of training. She considered this to be insufficient particularly when her online teaching was

not beginning until 2004. However, she intended to "practise" with the equipment by sitting alongside the students in The Correspondence School sessions and gaining further training from the teacher in charge of video conferencing. She remained optimistic and was looking forward to decreasing the sense of isolation she felt in her school as the only teacher in her subject area.

One principal commented that there were seven trained online teachers in her school and the training occurred in their school holidays. She questioned the value of staff training during their holidays as they did not have the opportunity to "refresh" themselves in preparation for the new school term. The school remains positive about the participation of a number of their teachers in the training despite the fact that there are so few online classes. The principal said that most of the teachers saw the training as a newly learned skill that will help them in the future and "be an addition to their CV".

The practising online teachers believed their experience after 3 years would be invaluable in training new online teachers because of the limitations of the training they participated in and the things they learned "on the job". It would be sensible to co-ordinate this information into a resource to help other e-teachers and inform the practice of e-teaching.

Challenges for the online/video conferencing teachers in Te Kura Hiko

As with the wharekura e-teachers, the online teachers in Te Kura Hiko experienced an increase in workload as they worked to meet new demands associated with using the technology and planning and implementing effective online lessons.

WORKLOAD

The online teachers identified workload as an issue in being an online teacher and said that at times their conventional classes suffered because of the extra load. Workload and workload-related stress were also identified by principals as having a major impact on the online teachers.

Both teachers said that having more students in online classes was an increased responsibility for the teacher. There was more marking, more students to monitor, and more students to build relationships with "at a distance". The technology itself could limit interactions between the teacher and the offsite students. Time delays in responses were frustrating for the teachers and the students, who were all used to immediate feedback in a conventional classroom.

The principals and the KAWM co-ordinator commented that there was a lot of dissatisfaction at the beginning of the project when the online teachers felt they were overworked and there was no compensation for their commitment to online teaching. They said that it seemed the "powers that be" did not understand that teaching online was different from conventional teaching. Frustration continued while it was decided how the online teachers were to be rewarded, and eventually management units were assigned to online teachers by their own schools, at their own discretion. The provision of grants to support the online classroom and the e-teachers in the Paerangi schools, as happened for the wharekura, did not occur.

In 2002 and 2003 there were only two subjects, computing and music, being taught by two online teachers to students at other Paerangi schools. While more teachers were being trained, principals were thinking about this issue and commented that the training provided had to be improved by broadening it to include more training in the pedagogy of online teaching:

> Teachers need to be trained in the technical area but also in the way you teach particular subjects online. Teaching maths online must be different to teaching music online. (Principal)

They were also reconsidering the "status" of correspondence courses in their schools as a result of their recent experience. In the past, schools and students often considered correspondence courses as "not as good" as courses taught in conventional classes. The incorporation of an online weekly tutorial for The Correspondence School course has led to changed views. Students enjoyed the combination of the online weekly interaction with the teacher, enabling them to clarify issues and points directly with the teacher, and the opportunity to work at their own pace on the printed teaching materials and assessments and sending them on as they were completed.

PLANNING AND RESOURCE DEVELOPMENT

The Paerangi teachers interviewed shared the view of the wharekura teachers that there were very few conventional class resources that could be directly used for video conferencing. One teacher said she was working "all hours" trying to prepare for her 2 hours per week of online classes, and her conventional classes. Some schools have been video taping online lessons that become part of their resource base.

The Paerangi teachers we interviewed did not have to translate resources at this stage but are aware that some Paerangi schools now have bilingual units and the requirement to translate into te reo Māori in the future is a possibility and will then be an additional workload issue.

IMPLEMENTATION ISSUES

As with the wharekura e-teachers the two Paerangi online teachers we interviewed commented that the nature of teaching online was very different to the conventional teaching that teachers had been trained to do. A major difference was the combination of using the technology and not having students physically in front of them.

One teacher said there were different protocols for teaching online; for example, when asking a question to the online class the teacher has to direct the question to a student by name rather than opening a question up to the whole online class. This is because the technology gets "confused" when more than one person speaks at a time.

One of the online teachers taught computing during 2001 and 2002 and used the First Class management system. By 2002 all her online teaching was computer-generated. The First Class program was installed on all the students' computers and this allowed her to see the students' work as they were doing it. She was able to mark it online, and email the results back to the students. The teacher was only online for 1 hour a week for this class, and this system allowed her

to email enough work to the students for the following lessons. The supervising teacher supported the students and if there were any problems, the students emailed the online teacher and in many instances she replied almost instantly:

> This is a good way to learn computing because she's on her computer at her school and we're on ours up here at our school and she can see on her computer what we are actually doing on ours. (Student)

> The First Class program is so user friendly that even I can use it. I am hardly needed in the classroom because this program gives the students pretty much direct access to the teacher even when not online. (Supervising teacher)

The First Class software package is designed to enable teachers, students, and groups within school communities to share ideas, resources, and to collaborate. While more training was needed for the online teachers in this system, the online teacher using it in 2002 thought it was an essential tool that allowed teachers to share resources and to reduce stress. At the time the ongoing cost for user licences was an issue and one principal suggested that this cost needed to be factored into the operational (curriculum) budgets of the Paerangi schools. Two principals, however, were concerned that the training that had occurred for this software did not seem to encourage the teachers to use it. On our return to the schools in 2003 we found that the original teacher was no longer using First Class as she only had one class of three online students and it was easier for the students simply to email their work to her.

Support for online teachers

CLASSROOM AND SCHOOL SUPPORT

The teachers commented on the need for "in class" support when teaching online, as did the wharekura e-teachers. They thought that this would be crucial for newly trained online teachers when they first begin teaching online. The support people could help with resource development, sending and retrieving students' work, and generally liaising with the offsite students.

The teachers said that the support of their principal was important in how they perceived their job satisfaction. In schools where there is a strong focus on ICT the teachers felt an integral part of the whole development:

> Our principal is so keen about ICT and motivated to make sure our students do not miss out on any ICT opportunity that we get all caught up in it as well. This of course makes her very supportive of us and what we do. She makes sure we feel like we are part of an awesome team and I feel good about my part in it. (e-teacher)

COMMUNITY OF SUPPORT

While the two online Paerangi teachers have a relationship as colleagues they recognise that as the number of online teachers grows the opportunity to build relationships would be important professionally. They looked forward to the day when there would be a larger number of online teachers and they would be able to "share notes" about online teaching and also provide

professional collegiality in curriculum areas in smaller schools where staff often work on their own.

OTHER SUPPORT SYSTEMS

The support from the KAWM co-ordinator was important. However, the co-ordinator was one of the online teachers herself and so was also facing similar stresses. The appointment of a co-ordinator who was not also an online teacher might be the only way to overcome this.

The online teachers reported becoming frustrated with technical problems and the difficulties in having these attended to by the cluster technicians. The cluster technicians travelled between schools as needed. The teachers suggested that each school needed to have their own technician, particularly when there are a number of ICT initiatives occurring at a school. One of the sample schools had an ICT teacher who was able to repair and maintain some of the equipment and this meant they did not have to rely on the cluster technician.

One teacher commented that the use of the video conferencing facility and the decision to be an online teacher was dependent on the attitude of the teacher. If the Paerangi schools want to make more use of video conferencing, then the provision of technical and professional support, to attract and sustain teachers, was essential.

The impact of Te Kura Hiko on pedagogy

As with Te Kura Ataata the interactions between online teachers and online students in Te Kura Hiko are different compared to conventional classes. The teachers recognised that they needed to have a relationship with their students that was not exclusively online and organised hui where they could meet in person. The positive value of this was stressed by the teachers and the students and impacted in the classroom—for example, the teachers could refer to other interests of the students. The Paerangi schools have a tradition of relationships involving sporting, cultural, and social occasions and these events are also opportunities for the online teachers to form relationships with their online students.

The online teachers said that they learned to be flexible in their teaching approach when online. They tried to vary approaches, so sometimes they were "lecturing", sometimes they were working one-to-one, and sometimes the students worked on their own. In general, it depended on how many students they had in their online classroom, including in their physical presence, who was supervising the class at the "other end", and on the subject being taught. Practical subjects such as music were different from other "not so practical" classes.

Te Kura Hiko provides the opportunity to make connections and links to other communities and so access a variety of resources to enhance their learning. Some students commented on the exciting work they have done via video conferencing. One class of students was studying climatic change in biology and they interviewed a world-renowned expert on climate change via video

conference. Another instance involved the students celebrating Black History Day and linking to a public library in Slough, England, to celebrate Māori culture with the people there:

> We have participated in some really exciting video links. It is wonderful to participate in them. (Student)

The teachers involved in online teaching thought, however, that the nature of the online classroom limited interactions between the online teachers and the offsite students. The need to build a relationship between teacher and student has been widely recognised in research (for example, Bishop, R., Berryman, M., Tiakiwai, S., and Richardson, C., 2003) and the two online Paerangi teachers met their offsite students in person in both years:

> It was great to meet my online students a few weeks ago when we organised a hui. It will make a difference when I teach them online from now on. (e-teacher)

The teachers are keen that this must happen regularly. This has not happened with The Correspondence School tutors as yet, but the principals are aware that it will be of value and will pursue this idea further with The Correspondence School.

The teachers all said that the indicators for a good online lesson were the same as for a good conventional lesson. The teachers mentioned signs that the students were engaged, such as asking and answering questions and completing tasks that had been set. They also said that the monitoring and marking of student work gave good information to the teachers about student progress.

One principal concluded from his observations of the online classes for over 2 years that they were just as successful as conventional classes once students and teachers adjusted to the new situation. The students seem motivated and engaged. However, some students who do not cope in conventional classes do not necessarily cope any better in video conferencing classes. He considered a slow change and improvement in teaching practice was occurring in response to meeting student needs in this new environment.

Students' views of online classes

In 2002 and 2003 we had discussions with 18 students about their video conferencing experiences.

WHAT STUDENTS LIKED ABOUT VIDEO CONFERENCING

The students all appreciated that video conferencing has enabled them to broaden the curriculum areas they could study and develop relationships with students from other schools. The Paerangi students regularly interact with other Paerangi students using the video conferencing equipment and consider the video conferencing of the Ngā Manu Kōrero hui in 2003 a major occurrence.

The Correspondence School co-ordinator at one school said that the students seemed to enjoy meeting with their online Correspondence School teacher once a week online and that this contact

made a difference to the amount of work completed. The students said that they were comfortable with the way the video conferencing with The Correspondence School works and that they preferred it to the traditional paper-based correspondence course. It was evident that students were more satisfied with their online teacher when they met more regularly online (either with extra scheduled classes or outside the formal lesson) and when they had met in person. They said that this relationship was important and made them stay on task and complete work because they interacted more often. The regular contact also meant they could ask questions and get feedback more often. The students said they were disappointed when classes had to be cancelled or postponed, and this was mostly due to technical difficulties.

In 2002 and 2003 we observed four online classes taught by two Paerangi teachers. One class was a Year 11 computing class taught by a Paerangi computing teacher in 2002. There was a total of 19 students in this online class, 10 offsite and 9 onsite with the teacher. This lesson was conducted using the First Class system software, enabling the teacher to observe online what the students were doing on their computers and the students to observe what the teacher was doing on her computer. The First Class system has an emailing facility allowing the teachers and students to email information to each other. This was an important facility in a large class such as this one the teacher said as it streamlined much of the operational functions required in an online class. The students commented that they liked the computing classes because they were quite interactive, both with the online teacher and with the technology. They said the First Class software made things exciting and different for them. They said the teacher explained things clearly to them so they understood what they had to do. They also said it was important that they had met the teacher in person and felt they could relate to her better because of this.

We observed the same teacher twice in 2003 teaching a Year 13 computing class to three offsite students, some of whom she had taught Year 12 computing in 2002. For one observation we were onsite with the students and for the other we were onsite with the teacher. The teacher said it was not necessary to use the First Class system software with this class because of the small number of students. The students in this class also enjoyed their class, and two still found it fun to have lessons via video conferencing despite not using the First Class software. They said the teacher still explained things to them so they could understand and having only three students in the class meant that there were a lot of teacher-student interactions:

> Because there are only three of us in this class she spends a lot of time talking to us individually, and you don't get shy to ask questions in such as small group. (Student)

These students, of course, had a good relationship with the teacher, not only because some of them had been taught by her previously but also because they had met in person previously.

We observed a Year 10 and 11 music lesson in 2002 taught by a Paerangi music teacher. She had six students offsite. After introducing the students to the objectives of the lesson, half the students worked independently off camera, reading notes and completing exercises in their books. The other students were at the keyboards and the teacher's camera was focused on them. She assisted the students with instructions on what they were doing and they asked questions during this time.

For those students it was a very interactive time. The groups changed activities half-way through the lesson. The students commented that they really enjoyed the class and they "loved" the subject because they got to play the instruments. They said that having opportunities to play the instruments provided motivation to do the "book work". They said the teacher was "awesome" and she gave clear instructions that they understood, and there were lots of opportunities to interact with her. They also considered they had a good relationship with her as they had met her previously. Normally they had a supervising teacher who also supported them in class by answering questions and helping with the musical instruments.

From our discussions with the students it was clear that a successful video conference class relies on an excellent e-teacher, who is able to provide a variety of learning opportunities within the online classroom and with whom the students have a relationship.

WHAT STUDENTS DID NOT LIKE ABOUT VIDEO CONFERENCING

When we asked the students about the not so good things about online classes, they initially said there was nothing wrong with them, apart from the odd "boring" class. However, with probing they did say that the interactions with the teachers were less personal and that the relationships were different because with one teacher you are "in their space" and with the other one "you only see them on the monitor". While some of the students said they did not mind the "distance" relationship with the online teacher, most of them said they miss the normal interactions they have with the teacher, such as "catching up outside the classroom". Students did acknowledge the efforts made by the schools to compensate for this, such as meeting face-to-face with their teachers.

They also said that the time delay caused by the nature of the technology in the online class was frustrating when they were used to immediate feedback from the teacher in conventional classes. Technical issues such as this were often raised, however the students realised that this was an ongoing area of development and technology was always improving.

Some students commented that some subjects and teachers are boring whether online or in conventional classes.

STUDENTS' IDEAL SCENARIOS FOR VIDEO CONFERENCING LEARNING

The online classroom in Paerangi schools is used by The Correspondence School for a large amount of time. The students prefer these correspondence courses—where the tutors video conference a tutorial once a week—to the traditional paper correspondence courses. However, most students would prefer a good face-to-face teacher "any day". If they have to participate in video conferencing classes in order to be taught a full curriculum the students liked the idea of at least one online session per day (or a minimum of four per week) with a supervising teacher who could help them if needed.

The impact of Te Kura Hiko on the school and the community

The school

Similarly to the wharekura, the shared timetable and providing supervising teachers for the online classes had a major impact on the Paerangi schools. At the same time a number of benefits were identified. The deputy principal and an online teacher at one of the schools, for example, considered the medium of video conferencing actually helped their students learn because it is "new and exciting" technology that keeps their attention and motivates them to attend the video conferencing classes. It also provides opportunities to learn about things they did not have the opportunity to learn about prior to video conferencing, such as regularly linking with overseas sites. One Paerangi school had linked up with a museum in England. The teachers said that this contributed to students' motivation:

> Video conferencing is really helping our kids learn and the opportunities are endless. The purpose of boarding schools is to create leaders and this technology is going to help us do this. (Deputy principal)

In 2002 and 2003 the majority of online classes in the Paerangi schools were courses from The Correspondence School. The KAWM co-ordinator helped schools organise their online class timetables, including The Correspondence School classes, to run alongside the school timetable. As long as the numbers of students participating in online classes were not high, most principals were flexible and allowed students to leave conventional classes to attend online classes. One school appointed a video conferencing co-ordinator to manage, onsite, the online classroom.

In the 2 years of the evaluation, a protocol developed whereby schools receiving an online class provided a supervising teacher. This resulted from the experience of both wharekura e-teachers and the Paerangi online teachers during the first year of KAWM, and ensured that behaviour management at a distance did not become the role of the online teacher. The impact of this on schools was a staffing issue where they have to have teachers available for this supervisory role, and many do not.

In 2003 one of the schools was investigating networking each boarding house within the school with computers and installing video conferencing equipment in each boarding house.

The community

Similarly to wharekura, while the original intention was for boards of trustees and communities to have access to the video conferencing facilities, in reality this was slow to happen. Schools were developing policies and protocols for the use of the equipment and expected an increase in use in the future.

During 2003 one of the Paerangi schools encouraged the use of the equipment by the wider school community. Board members had meetings using the equipment, teachers had a video conference meeting with the Ministry of Education in Wellington, and the community was invited to be involved in the Ngā Manu Kōrero hui by video conferencing.

Building relationships between schools

The principals commented on the social aspect of participation in the KAWM project. The interaction with students from other boarding schools in Te Kura Hiko helped "break down barriers" between the schools, although many of the schools interacted on a traditional basis in some areas anyway. Relationships developed and these were further strengthened when the schools participated in national hui, such as the Paerangi celebrations and the Ngā Manu Kōrero. The relationships were not limited to the Paerangi schools, as they also interacted with some of the wharekura in online te reo Māori classes:

> It has helped our kids develop relationships with others. I think it has allowed our students to develop their social skills in a guided way, where we can be less obtrusive. (Deputy principal)

> It's nice to speak to other Māori students at other boarding schools. (Student)

A series of "chat sessions" was set up for the Paerangi students at lunchtimes, and while the students did not participate every time, the principals consider these sessions contributed to "breaking down the barriers" with other schools:

> The chat rooms are very good for our girls, they are buzzing after them. There is an etiquette and the girls know it. (Principal)

One student had training as a technician and had gained a "Video Conference Licence". The student assisted the online teacher as her technician for a year, during her non-contact periods and gained the licence. This involved using the remote control and controlling the camera work while the teacher used the document camera.

In addition, the video conference equipment was used at least once a month for meetings between all Paerangi principals in 2002 and in 2003. We were able to observe one of these meetings involving three of the five Paerangi principals. An agenda was followed, items discussed, decisions made, and information was shared. The principals emailed each other prior to the meeting with agenda items:

> This is such a good option for us because it doesn't cost us anything to dial up, we can see each other and we can fit it in at our convenience. It's better than trying to get everyone to leave their schools and travel all over the country. And we get to hui with each other more. As a relatively new principal I find this really helpful and supportive. I'd love to be able to do this with our board of trustees meetings. (Principal)

In some schools the hostel staff have been communicating via video conferencing. We observed one school hosting a meeting with another. The initial purpose of the meeting was so the hostel staff could get to know each other. Initially, many of the staff were not comfortable in front of the camera. However, by the end of the meeting, the hostel staff expressed the hope that future video conferences could be held to share ideas about hostel practices.

The principals expected this type of interaction between the schools to increase as more staff become familiar with the technology and with the idea of interacting online. They said they were yet to fully realise the impact of online technology on the boarding aspect of their schools:

> We need to step this technology outside the school day to encourage all people in our Paerangi school communities to participate. Imagine being able to have meetings with say the Wellington parents by video conference on the weekend. (Principal)

The laptops and ICT professional development

This programme is the same as the one offered to the wharekura teachers and principals. Teachers had the personal use of a laptop and were required to participate in a 2-year ICT professional development programme.

Professional development

By the end of 2003 a total of 74 teachers from Paerangi schools participated in the ICT laptop professional development programme. We interviewed five teachers in 2002 and five teachers in 2003 who were participating in the programme.

There was general satisfaction by the participating teachers with the professional development programme provided and a recognition that their new skills had, over time, reduced some of their workload issues:

> Yes, it has helped ease the pressure because we've got this awesome tool and we know how to use it, but at the beginning it wasn't that great. (Laptop teacher)

However, three of the teachers said the training workshops and tutorials should have been spread out over the 2 years rather than condensed into 13 weeks, or more workshops added during the last 18 months of the programme. One school extended their own training sessions for their teachers by using the video conferencing equipment. They identified collectively the areas where they needed further training and arranged professional development in these areas.

Despite these reservations about the training, those interviewed in 2003 thought that their access to a laptop was positive for their work as teachers:

> The laptop is affordable, efficient, mobile, and accessible. It helps me be more creative with the work I present in class. I wouldn't be without it. (Teacher)

> The Laptop programme still has an effect on my teachers and they have helped make a great contribution to changing teaching practice in my school. They have increased confidence and improved work presentation and planning and so now I think we are seeing the impact on the students. They have got to be benefiting from it now. (Principal)

Impact of the KAWM Laptop programme on teachers and teaching

The comments made by the Paerangi teachers about their use of their laptops for administrative tasks, developing resources, for classroom use, and for networking were consistent with those made by the wharekura teachers. The exception being, of course, comments made about the development and sharing of resources in te reo.

Most teachers used their laptops at least 2–3 times a week. All the teachers used their laptops to gather resources from the Internet. Preparation of lesson plans was a common use and teachers used their laptops to develop unit plans or to create worksheets and templates. Some teachers used Microsoft PowerPoint to deliver lessons in the classroom. Laptops also allowed teachers at schools that had multimedia equipment to deliver lessons with the aid of videos or video slides and pictures taken with digital cameras.

In 2003, the majority of the laptop teachers we interviewed said that their attitudes towards ICT were generally more positive as they became more confident in using ICT in the classroom, including their laptops. One teacher commented that she could now work and talk with students about things related to ICT that she had little knowledge of previously. Another teacher said she felt more confident and professional in her classroom practice, because ICT had helped her be more organised. One teacher had noticed positive changes in terms of his use of Internet resources, slowly gaining more confidence in explaining ICT terms and practices to students, and in terms of building and strengthening relationships between teacher and students through email and online classes.

Networking

The teachers all reported using their laptops for communication and forming and maintaining networks. They regularly emailed other teachers, and asked for and shared advice and information. Sometimes this was about curriculum issues, such as NCEA, and sometimes it was about extracurricular issues, such as kapa haka or Ngā Manu Kōrero hui. Some of these activities were centred around the Paerangi cluster but some were not. The teachers said that the laptops contributed to building relationships between the cluster schools because of the ease of communicating with each other.

In one Paerangi school all staff were on email. Staff were told to check their email at the end of week one of the holidays for any timetable change, so they knew what would be happening on day one of the new term. The principal of this school could also email all students in the holidays with notices about the new term as they also all have email addresses:

> It helps with communication between teachers at our school. Our online teacher has students and their parents emailing her during the holidays to find out about their work. The teachers use their laptops for planning, and their level of ICT literacy has greatly improved. (Principal)

Technical issues

Some of the problems experienced by teachers include technical problems with the laptop and the lack of ports for Internet access in schools. These types of technical problems are most easily solved by having technical support available and by schools developing and following a well-planned ICT strategy, that may include plans to increase the number of ports available for staff. In one of the Paerangi schools, for example, the staff use of the laptops was limited by the lack of ports at school but this school was having a large computing suite built, including a video conferencing suite, which will help overcome this problem. The building of this facility was part of the vision this school had for ICT development in their school and the principal acknowledged that involvement in the KAWM project helped see this eventuate.

Looking ahead

All the teachers interviewed said that the Laptop programme has made the teachers "feel good" about their jobs. They felt more valued and their commitment to teaching increased:

> We feel good about this project because it affects all areas of our school, from the video conferencing to all the computers to this personal laptop for us teachers. It's been quite a comprehensive 'hit' from the government. It has really boosted morale. (Laptop teacher)

One principal said that the Laptop programme contributes to and enhances the "ICT flavour" they have and want in the school:

> The more laptops the better, it's the way of the future, for everyone in schools, kids, teachers, admin people, and hostel staff. (Principal)

While there was general enthusiasm for the overall programme there was also recognition that an ongoing plan was needed.

The teachers and principals thought the Laptop programme needed to be ongoing in two ways:

1. to ensure all new teachers are included on the programme[14] and
2. to continue the professional development on a needs basis.

One teacher said that during the training the teachers did not have the "space" to think about the implications of having the laptop at your "disposal". However, after a year or two of use, one could identify areas of personal skill need.

Another teacher suggested that cluster schools could receive the appropriate funding as a cluster and plan and develop their own programme of training. The teacher was confident that the experience the schools had to date meant they had the capability and experience to do so:

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[14] The Ministry of Education's TELA (Laptop for Teachers) scheme has made this a distinct possibility for most teachers.

> It would be great to have the autonomy to carry this whole ICT buzz forward. (Laptop teacher)

A number of teachers and principals also commented that they would like all senior students at least to have laptops because of their own experience with the Laptop programme. One school purchased the ex-KAWM laptops and provided them for the Year 13 students to use and another school provided these laptops for part-time teachers who would not qualify for the STELA/TELA machines. A suggestion was made at one school to link the laptops into the school network system to improve the impact this tool would have on teacher workloads, for example report and record completion.

In looking ahead the issue of adequate technical support was again raised, with principals suggesting a dedicated person in each school to oversee the Laptop programme, deal with technical issues, and cover other aspects of KAWM and ICT generally. They saw this as critical particularly if teachers' attention was not to be diverted from their students to solving technical problems.

The school-based ICT infrastructure

This initiative involved the provision of "thin client" networks in all the clusters, using a powerful server in each school to get a higher level of performance from recycled computers. The Paerangi schools' cluster received 174 thin client computers (ratio 1:3) and received financial assistance to set up the cabling infrastructure to enable high-speed network connections.

As with the wharekura, one of the reasons the Paerangi schools were supplied with a network was to support the online classroom.

Installation

In 2002, two of the principals said there were some problems in the installation of the network in their schools; for example, waiting for equipment to arrive and waiting for the technical assistance to install the equipment. In one school the server was 6 months late in arriving in the school. The schools had multimedia equipment but there was no training for teachers to use it. At this time, too, one school still did not have a one computer to three students ratio and initially the students could not get Internet access:

> While there are hassles the impact of KAWM on our schools has been great and we are better off with it. We just need to sort out the difficulties and fix them. (Laptop teacher)

In 2003, one of the Paerangi schools added more classrooms to the network and employed an ICT teacher who has made all the difference to how the network is used and maintained. By the end of 2003 all installation had been completed.

Implementation

The principals said that the network has made a difference to administrative tasks. In one school the incident reports for hostels were done on computer and were available via the Intranet. The principal was able to open the matron's folder first thing in the morning and see what happened overnight in the hostel. The matron found it a better system than having to write a report in a book and then photocopy a copy for the principal. The principal said that having a computer in the matron's office and the decision to provide the hostel staff with training gave them access to the technology, allowing them to deal with things more efficiently. They were continuing using this system in 2003 and attempting to involve more hostel staff in training.

One school prioritised some of the computers to be sited in the boarding hostels in the school. However, the prohibitive cost of the cabling to network these computers with the ones in the school prevented the maximum advantage of this being realised:

> We want our students to be able to log onto the network from any computer on the complex and that includes from the hostel. We are wanting to encourage 24-hour learning but the cost of the cabling is stopping us. (Principal)

In 2003 the principal and board of trustees of this school made a commitment to provide laptops for the Year 13 students. They gave the KAWM laptops purchased by the school to the students, since the teachers were becoming eligible for laptops through other initiatives. All the students at this school had email accounts and the principal regarded the provision of the laptops and availability of computers to all students as an important step to realise the potential of the technology in student learning.

One of the schools had 50 computers including some sited in the library, music suite, and art room. The students had access to the computers in the evenings. The music suite had six computers. The students could write music, the computer played it back to them, and they could record and tape it. The library had a pod of computers and the librarian provided support for the teachers and students who used these computers. The librarian mainly assisted the students to locate information and drew up plans to help them carry out research. Sometimes teachers sent individual students to work on the computers, and at other times a class used them. The librarian said she had seen the students' and teachers' confidence in the use of the technology improve a lot since the implementation of the KAWM programme in the school. She helped the teachers and students use the computers to produce the school magazine. The computers in the art room were mainly used by the students to do graphic presentations.

There were a number of problems encountered by some schools. When reflecting on the network, teachers once more referred to the lack of on-hand technical support and the subsequent delays waiting for a technician to respond. These delays meant that the students could not use the computers and the teachers had to re-plan their lessons around this.

The ICT teacher at one of the schools looked after the computers, servers, and the video conferencing equipment. This responsibility was not within his job description and he was not a

technician. However, the school decided they needed an onsite person to look after the equipment and to be the first contact person within the school if things went wrong, including the laptops. One principal suggested that if ICT was to be an integral part of the government strategy to have a knowledge economy, then the inclusion of an onsite technician in the staffing formula for each school would be valuable.

One of the Paerangi schools appointed one of their staff members as the KAWM site co-ordinator at the beginning of 2003. This was their own initiative and the need was determined because of their earlier experience with KAWM where the workload fell on the principal. In the 2003 interview this principal indicated that the KAWM role was a significant workload issue. The newly appointed teacher was also the head of the ICT department. Her role was to complete all the administration tasks for KAWM and the ICT department, to work closely with the principal, to organise professional development for teachers and students (such as their computer "drivers' licences"), and to encourage and assist teachers in their use of technology. One of her administration jobs was to organise the timetable for all the KAWM ICT equipment and she liaised with the teacher in charge of The Correspondence School courses. The principal of this school commented that the appointment of a person in the position of KAWM site co-ordinator had improved the KAWM experience in the school, and provided much needed support for the students, teachers, and the principal.

Despite the challenges, the staff we talked to from all three schools said that it was better to have the computers and infrastructure than not to have it. In 2003, one school made a commitment to ensure that all students had the use of the KAWM ICT equipment at least three times a week, and it was the job of the site co-ordinator to timetable this to happen. This was to support the importance the school placed on using ICT as a tool for learning "for the future".

Looking ahead

In 2003, schools were beginning to look beyond the use of the ICT equipment just for their students, and one of the schools ran a community computing class using the ICT equipment provided by KAWM.

The principals all had concerns about the sustainability of the ICT programmes in their schools if the KAWM funding was no longer available. While they acknowledged that schools must make a commitment to ICT in their schools, they were concerned that the second-hand KAWM equipment would drain their ICT resources. One principal commented that without the funding they would not be able to keep the video conferencing operating as they have unlimited 24-hour access currently:

> It would be difficult to operate without the KAWM funding, our whole infrastructure is reliant on KAWM. (Principal)

At the same time principals said that having a number of initiatives in the schools at once was of concern. One school had been involved in three "pilot" programmes. The principals said that

while initially the opportunities offered outweighed any other concerns, in the end there was disappointment when the pilot was completed and there was no follow-up action in response to the outcomes of the pilot:

> They create excitement and then we are deflated. (Principal)

The principals commented that more training is needed for teachers in using the network, to allow them to continue to develop in ICT areas, to integrate the technology into their teaching, and so to build the expertise in their schools.

All the principals we interviewed believed that ICT use in their schools had contributed in some way to raising student achievement although no one could specify exactly where and how. This difficulty was raised in fact by the principals interviewed in all the clusters. The majority of the principals believed that the effects of ICT use as part of KAWM could not be measured because little baseline data had been gathered before they were involved in the project. Therefore, it was difficult for anyone to say that ICT use alone was a contributing factor to raising student performance in their schools. Also, most of the principals believed that ICT was only one of many tools that they used to teach students and between them all there were different meanings of what achievement might be and different ways of expressing or reporting student achievement. As important, it was felt that access and use of ICT was now an integral part of daily life in schools and classrooms and without its inclusion the students' learning would effectively be negatively affected.

ICT in teaching and learning

Classroom use of ICT in 2002/2003

In 2002 we did not focus on gathering information in detail about the use of ICT in the Paerangi schools as the schools themselves primarily concentrated on the online classroom and the laptop aspects of KAWM in the first 2 years of the project. However, in 2003 we increased our focus on this aspect of KAWM.

Generally, in 2002 we found that the students used the computers in their classes for word processing, to gain Internet access, emailing, downloading music, and drawing graphics. Access to the Internet was problematic in some schools and limited student use of the computers. This problem was resolved in 2003 for those schools by improved cabling. In one school an activity such as downloading music was regarded as a "reward" activity for students who had finished their class work early and satisfactorily.

Some teachers used the computers in their teaching for using and demonstrating Internet access, desktop publishing, PowerPoint presentations, and word processing. The teachers said that the training they had with the laptops helped with their use of the computers in the classroom.

However, they thought that they still needed dedicated training about the effective integration of the technology into their everyday teaching.

Generally, in 2003 we were told that students used computers every day at school. One school had particularly high use probably because of their new computer suite although the principal said that they have always had high student use of computers in their school. To find out what some of the most common uses of the computers were we gave teachers a list of 17 different ICT activities ranging from word processing, creating PowerPoint presentations, to researching material on the Internet. We asked them to indicate how often their students used these aspects of ICT in 2003. The most common uses were word processing, creating PowerPoint presentations, email, searching for information on the Internet, using spreadsheets to create graphs from number data, and creating graphics with ClipArt.

New multimedia equipment was purchased by one of the Paerangi schools during 2003 in response to the high use of ICT-integrated activities in the classroom. A new data projector and digital camera were bought and students used this equipment to produce booklets and to create a website.

Teachers reported that they were integrating ICT into their teaching practices in new ways. One teacher reported that in 2003 she was using the data projector and PowerPoint to present information to the class more frequently than she did before. Another teacher was teaching his music class and showed how he was integrating ICT into his programme. He used his laptop to present a PowerPoint presentation of a music video clip to the class that he was able to manipulate as needed, so that he could point out particular segments and speak about them. He also used the data projector and his laptop to show the students how to use the software on their computers to compose their song. The Internet was a common tool used as a source of information for a given essay topic and research in general. The Paerangi teachers believed that their students have benefited significantly from being involved in the KAWM project. In particular the ICT aspect has added value to their learning which they say is evident in the quality of their work and their raised level of interest in learning.

Students' experiences of classroom ICT use

The students indicated that there had been positive changes in their attitudes towards ICT since the KAWM project began. While they said they have always liked using computers and playing games on them they now say that they know how to do more things. This has made their attitude change from computers being for recreation only to computers being valuable for "work and fun".

The students also regard computers to be an integral part of their learning programme and expect to use them at least once a day.

In 2003 we observed six ICT-related classes. The students enjoyed becoming more upskilled with ICT and learning new ways of doing things:

> We are learning all this stuff about the actual computer, like how memory works and that. It's hard but I feel like I am learning something. (Student)

> Every day in computing you learn something new, even if it's just a different way or a completely new way of doing something. (Student)

Sometimes the students worked out "short cuts" themselves; for example, when word processing or using programs such as ClipArt, or the teachers gave them "handy hints". They regard both these situations as valuable learning experiences. They enjoyed opportunities to carry out research using the Internet and looked forward to times when the teacher allowed them to "surf the Net". The students commented that they get a lot of satisfaction from being able to be creative using ICT, for example, with programs that allow you to design presentations yourself. The students at schools with multimedia equipment were very excited about using this equipment to produce film clips, such as those involved in the Te Maioha Project:[15]

> We have loved doing our programme for this series, it's like real stuff with all the planning and directing and that and now we can't wait for Māori TV to start so we can show them our work too. (Student)

One of the schools has a film-editing suite and the students consider learning skills about this technology important for their future employment prospects:

> Learning about this stuff is a whole step up. I really want to do something in TV like be a camera man or something so this will surely be a help. (Student)

Some senior students commented that they liked it when the teacher let them "get on with our own work" during ICT lessons. This not only gives them the opportunity to work at their own pace but also to explore and develop their own ideas and to be creative. This was important they said when they were working on activities like presenting their work for assessment, where they wanted to produce the best work possible for themselves.

The students in the music class where the teacher integrates ICT into the lessons found the lessons interesting because they saw the value of the ICT being used:

> Music would be so boring without this ICT stuff, even though playing instruments isn't. But the computer programs we use actually help you to do things like write music. (Student)

Some of the students said that while they considered the experiences they currently have using ICT to be useful and adequate, they looked forward to having a lot more ICT-related experiences and having ICT integrated into all their classes. The senior students who were gaining access to a personal laptop saw this as a positive initiative and could foresee a future where all students would have one:

> Computers are an important tool that helps us with our work in so many ways that we should all have access to them all the time and in all classes, instead of just in some. Even

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[15] The Te Maioha Project is a Māori language series that will be shown on national TV, involving students from different wharekura and Paerangi schools producing the programmes.

the teachers are keen to use them more, especially those ones with their own laptops. (Senior student)

Summary

Te Kura Hiko

- As with the wharekura, the Paerangi schools decided to participate in the KAWM project to provide their students with a wider curriculum and opportunities to build and extend relationships between schools.
- Te Kura Hiko enabled the schools to achieve this to some extent within the last 2 years of the project.
- The appointment of the KAWM co-ordinator during 2002 streamlined the organisation in the schools, including the provision of a shared timetable. This position was considered vital to the ongoing uptake of online lessons.
- In 2002 and 2003 Te Kura Hiko offered music and computing in the three schools we visited. The three schools also had approximately 100 students enrolled in online Correspondence School courses. These courses are an option for Paerangi schools as, unlike wharekura, they do not require that all their courses be delivered in te reo Māori. The principals saw it as a pragmatic decision given that involvement with The Correspondence School did not place such demands on potential Paerangi e-teachers. However, their experience with correspondence courses with online weekly tutorials led them to consider this to be a valuable way of having learner-centred education in their schools. The students were benefiting from having a weekly online tutorial with The Correspondence School e-teacher along with the requirements of working individually and forwarding work as it was completed. They were completing more work and enjoying the courses.
- The video conferencing equipment was used for online classes for students, online social hui for students, online meetings for principals, and online meetings for hostel staff.
- Use of video conferencing for teacher professional development has been limited and there was no use for teacher online meetings in 2002 and 2003.
- The schools have found that technical support in the maintenance and repair of the equipment is critical for Te Kura Hiko, and access to this needs to be immediate.
- As with the wharekura e-teachers, the online teachers have found that online teaching differs from conventional teaching in a number of ways; for example, more advanced planning is required and a more structured approach is required for implementation. It does, however, offer new possibilities, such as linking with international experts and visiting relevant national and international websites.
- While the students and the teachers miss the immediacy of person-to-person contact, the schools have found value in having hui for Te Kura Hiko to enable the online teachers and students to meet and establish relationships.

The laptops and ICT professional development

- There was general satisfaction with the ICT laptop professional development programme although it was thought it would have been more valuable to spread the active part of the programme over 2 years rather than having it condensed to 13 weeks.
- Access to a laptop and the skills to use it have enabled teachers to use computers on a regular basis to plan, gather and prepare resources, complete administrative tasks, and communicate with other teachers. Some teachers were beginning to use the laptop within their lessons.
- Teachers were beginning to use their laptops as a classroom resource in some simple ways in the first years of KAWM, such as allowing students access to the Internet. In 2003 a number of teachers said they wanted to "move further" in this area to capitalise on the ICT "revolution" that was happening in some of their schools.
- Further professional development and onsite technical support were seen as key to improving classroom-based use.

School-based ICT infrastructure

- By 2003 the installation of the network in each of the three schools had been completed. This had given considerable support for school-related administrative tasks. An example in one school was the link provided to the boarding hostel, although in another school the cost of cabling between the school and hostels proved prohibitive.
- In 2003 the schools were working to identify the "personnel infrastructure" that was needed for the effective use of the network as well as to support its ongoing development. As with the wharekura the importance of an onsite technician was seen as critical as was someone to organise continued professional development to ensure that all staff had the expertise needed for all aspects of their jobs.
- Within the classroom, teachers' use of ICT was evolving, assisted by access to a wider range of multimedia and increased expertise in purposeful use in the context of specific curriculum areas.
- As with the students in the wharekura, the Paerangi students enjoy the opportunity to extend their use of ICT and were particularly enthusiastic about the opportunities they now had to use new media such as in making films. Some students were keen for continued integration of ICT-related experiences within the various subject areas.

Section Four

School-based ICT Infrastructure: Project Rorohiko – Kiwa

Introduction

The school-based ICT infrastructure is referred to as Project Rorohiko in the Wairoa and Gisborne clusters of schools. It involves the provision of "thin client" networks to the schools, along with a powerful server to get a higher level of performance from recycled computers to improve student access to ICT and its use in learning. The Gisborne cluster of schools, referred to as Kiwa, was allocated 1200 computers to give a ratio of one computer to every four students, and provided with technical support and access to a Learning Technologies Facilitator.

The Kiwa schools

Of the 41 schools in this cluster we visited seven schools over an 18-month period. Four schools were visited in 2002. Three of these schools were revisited in 2003 along with three new schools.[16] One of the three new schools replaced the school from 2002 that did not wish to participate in the evaluation in 2003. Table 5 provides background details of the schools and the data-gathering strategies used. Five of the six schools visited in 2003 were located in Gisborne itself, and one within 20 minutes' drive of the city.

[16] One of the four schools we visited in 2002 did not participate in the evaluation in 2003. This gives a sample total of seven schools in this cluster: four schools were involved in 2002 and only three of these were involved in 2003 along with three new schools. Although we visited some of the same schools in 2002 and 2003 we did not interview the same teachers and students or observe the same classes.

Table 5 ***Kiwa cluster sample schools and data sources***

School ID	*School type*	*Decile rating 2002/2003*	*School roll 2002/2003*	*Interviews*		*Class observations*	
				2002	*2003*	*2002*	*2003*
One	Intermediate	2	544	Principal 1 Yr 7–8 teacher 4 Yr 7–8 students		1 Yr 7–8 class	
Two	Secondary	2	869/874	Principal 2 Yr 9 teachers 1 Yr 9–10 teacher 1 Yr 11–13 teacher 8 Yr 9 students 4 Yr 11–13 students	Principal 1 Yr 11 teacher 4 Yr 10 students 3 Yr 11 students 3 Yr 12 students	1 Yr 9 class 1 Yr 11–13 class	1 Yr 11 class 1 Yr 10–12 class
Three	Contributing	8	133/146	Principal 1 Yr 5 teacher 4 Yr 5 students	Principal 1 Yr 0–2 teacher 1 Yr 5–6 teacher 1 Yr 3–4 teacher 5 Yr 3 students 3 Yr 5 students 2 Yr 6 students	1 Yr 5 class	1 Yr 3–4 class 1 Yr 0–2 class 1 Yr 5–6 class
Four	Contributing	5	446/457	Principal 2 Yr 5 teachers 8 Yr 5 students	Principal 1 Yr 3 teacher 1 Yr 4 teacher 1 Yr 5 teacher 5 Yr 5 students 5 Yr 4 students 1 Yr 3 student	2 Yr 5 classes	1 Yr 3 class 1 Yr 4 class 1 Yr 5 class
Five	Full Primary	5	252		Principal 1 Yr 7–8 teacher 1 Yr 6–7 teacher 4 Yr 6–7 students 4 Yr 7–8 students		1 Yr 6–7 class 1 Yr 7–8 class
Six	Contributing	1	220		Principal 1 Yr 3 teacher 8 Yr 5–8 students 2 Yr 2 students 1 Yr 5 student 1 Yr 3 student		1 Yr 7–8 class 1 Yr 2–3 class
Seven	Contributing	3	192		Principal 1 Yr 5 teacher 1 Yr 5 student 1 Yr 6 student		1 Yr 5 class 1 Yr 5–6 class

Between 2002–2003 we interviewed seven principals[17] about their schools' ICT capabilities and uses prior to Project Rorohiko, the implementation phase of the project, and the current use of ICT in their schools. Nineteen teachers were interviewed about the use of ICT in their classrooms and schools. Twenty classes where students used ICT were observed and discussions about their uses of ICT were held with focus groups of students (81 students in total) from these classes. Three of the four schools we visited in 2002 were also involved with the EDUNET Eastland Trust Cluster. Its focus was to provide support for teachers to develop their IT skills for classroom use. EDUNET also provided support for teachers who were completing a Diploma in Information Technology paper offered by Christchurch College of Education. In 2003, only one school was still involved with EDUNET and accessing professional development support for their teachers, while the other schools had identified they did not need the professional support provided by EDUNET at this particular time.

Project Rorohiko – Kiwa

Support given to schools in the Kiwa cluster

As part of Project Rorohiko schools in the Kiwa cluster, as with the Wairoa cluster, were to have technical support and access to a Learning Technology Facilitator (LTF). In the Kiwa cluster one person initially served as both technician and LTF. As the workload increased each position became full-time. However, when the LTF position became vacant within the first year it proved difficult to appoint a full-time LTF. In 2002, the cluster was served by a part-time KAWM project co-ordinator, two full-time technicians until the end of April, then a single full-time technician. As the LTF funding was still available, the schools were surveyed about their learning needs as a way to determine the best use of the funds. As schools had developed a programme that used ICT-lead teachers as workshop facilitators, rather than using an LTF, they wanted the funding to support their programme. In 2002 and 2003, the project was managed by the Kiwa Education Partnership. The main roles of the partnership included providing technicians and technical support to the Kiwa cluster schools and managing the LTF funding now available for the lead ICT teachers to co-ordinate teacher release and professional development required by the schools.

Reasons for getting involved in Project Rorohiko

When we asked the principals of the four Kiwa schools we visited in 2002 why they became involved in Project Rorohiko, one principal said that the main reason their school became involved was because they were keen to join other schools in their district who were already involved in the project. The principal saw the project as an opportunity to build on the school's

[17] Four principals were interviewed in 2002. Of these principals, three were interviewed again in 2003. Three new schools were included in the evaluation in 2003 and the principals from these schools were also interviewed.

existing ICT development plans. Another principal said it was a way to get more computers into the classrooms and ICT support. One principal said the project had already started before he arrived at the school and he was not sure why the school had got involved.

Three of these four original principals said that being involved in Project Rorohiko allowed them to achieve their schools' ICT goals sooner. These goals included increasing student access to computers, and setting up a computer suite. The fourth principal said that being involved in Project Rorohiko meant there was more opportunity for staff and students to become involved in teaching and learning through ICT.

Overall, the main reasons principals agreed to participate in Project Rorohiko involved wanting to increase the opportunities the teachers and students had to interact with ICT and improve skills, knowledge, and understanding. They saw the provision of "thin client" networks and the use of a powerful server in each school as a possible means to improve teacher and student access to ICT and its use in learning.

The situation prior to Project Rorohiko

In 2002, we interviewed teachers and principals about their attitudes towards ICT use in schools, their use of ICT in the classroom, and their schools' ICT capabilities in order to establish the situation prior to Project Rorohiko. As previously explained, we did not ask the new schools in 2003 these questions.

Attitudes towards ICT

Prior to Project Rorohiko the attitudes towards ICT reported by the four principals in 2002 varied. One principal was frustrated because of his lack of access to ICT. The attitudes of his staff also varied largely because they were not all at the same level in their use of, and confidence with, ICT. Another principal, whose school had been involved with ICT since 1992, said that ICT had its place in schools but he was unsure about the evidence of its impact. Staff attitudes towards ICT prior to the project in his school ranged from "total users to non believers getting up to speed". Another principal had a positive attitude towards ICT because the school had already been involved in other ICT initiatives, though he said that many of his staff had been ignorant about ICT. The fourth principal said that his attitude towards ICT was very positive and his staff were open-minded towards ICT.

All the principals interviewed in 2002 said their own attitudes towards ICT were important in terms of determining the success of the project. The principals agreed that having a positive attitude towards ICT was critical to the project's success. Three of the principals were confident in ICT use prior to the project, and so were their staff. The principals in the schools that joined the evaluation in 2003 also said that their own attitudes towards ICT were important in determining the "uptake" of the project by their staff.

The majority of the teachers interviewed in 2002 indicated that their attitude toward ICT prior to Project Rorohiko was positive. There was a general view that having ICT in the classroom was a useful tool for teaching and that having classroom-based access would also contribute to their own development of ICT skills. One teacher was apprehensive about ICT because she had no prior experience with it.

The teachers said the students generally had positive attitudes about ICT. Two teachers said their students were positive although one of these teachers said her students became bored once they realised the computers were not just for playing games. One teacher said her students were positive about having computers in the classroom although initially they were reluctant to use them.

Equipment prior to Project Rorohiko

The amount and type of ICT equipment the four schools had prior to Project Rorohiko varied. One school had three file servers and 60 computers, one school had approximately 100 computers, a thin client network, and a number of printers. Another school had a suite of 18 computers and a small number of computers in the classrooms. They had licences to use most Microsoft software products. The main software used was Microsoft Word and Publisher. The three additional schools considered themselves to have been "relatively well equipped prior to Project Rorohiko", but said that compared to the total amount of equipment they received from KAWM perhaps they had not been that well equipped "in reality".

Of the eight teachers interviewed in 2002, one teacher had had thin client workstations similar to the computers they received with Project Rorohiko in their classroom. Three teachers had a single stand-alone computer in their classroom (one of these did not work). One teacher had four computers. Two teachers had no computers in their classrooms, but one of these teachers used the school's computer suite for ICT lessons. One teacher was a computer studies teacher so the classroom she used was the school computer suite.

Prior use of ICT

Prior to Project Rorohiko, seven of the eight teachers interviewed in 2002 used ICT for organisational and administration tasks. Common uses in this area included creating task sheets, preparing school reports, and publishing newsletters. One teacher did not use ICT in the area of organisation and administration, but did everything by hand. All the teachers interviewed used ICT to gather resources. Some teachers downloaded teaching resources and information from the Internet regularly. Te Kete Ipurangi, Assessment Resource Banks, and English Online were commonly accessed websites.

All the teachers interviewed said they received support to integrate ICT into their teaching practice. Most of this was at their school, from colleagues, the KAWM technician, and Learning Facilitator. A few mentioned the TUANZ conference where they saw the work of other teachers from different schools. Others were taking ICT papers through a tertiary provider.

Five of the teachers had used ICT to prepare and deliver lessons in the classroom. Another teacher said it was difficult to prepare and deliver lessons using computers because there was only one PC in the class. Email was only used on a minimal basis, for either colleagues or parents. Most communication with parents was through newsletters or telephone. One teacher had published a newspaper on his computer at home and distributed it to parents. Only one teacher said they used email to communicate with the wider school community.

Seven of the teachers interviewed said they used a computer at home for school purposes on a regular basis prior to Project Rorohiko. One teacher said they never used a computer at home.

Most teachers said student use of ICT before Project Rorohiko was irregular and not part of lessons. It might happen on wet days, or before school. The computer studies teacher said that students used ICT most of the time in her lessons.

The teachers were asked about the different uses of ICT by students, to find out what was occurring before Project Rorohiko. Games were the only ICT activity which all teachers said their students did. Information retrieval using the Internet, and open-ended problem-solving were mentioned by three-quarters of the teachers. Around half the teachers said their students were using other ICT activities, such as word processing new material, graphics, and analysing data. Only one teacher's students were using email, downloading music or pictures from the Internet, or simulations.

All of the teachers interviewed said that their students were keen and interested in many of the computer-based activities prior to Project Rorohiko but their involvement had been limited by the availability of computers.

Implementing Project Rorohiko

In 2002 the four principals were asked about the implementation phase of Project Rorohiko in their schools.

Support for setting up Project Rorohiko

Two schools solicited and received technical support from outside Project Rorohiko—one to install extra network cabling, and one from EDUNET to help with some of the technical aspects of setting up the project.

Two of the schools had relatively smooth implementation processes, and two had not. In one of the schools with smooth processes, some minor technical modifications needed to be made to the school's existing network. The role of the two KAWM technicians had been vital, and one principal also thought the fact that good communication between the people involved had occurred during this phase was important to the success of this implementation.

The two schools that experienced problems both had existing networks which created difficulties in trying to combine systems. One school faced substantial additional costs because extra

equipment was needed and the school had not budgeted for this. They had to engage an outside consultant to help fix the problem. The fourth principal was not satisfied with the implementation process since his school continued to experience technical difficulties and they did not receive the technical support they needed. In 2003, this school employed a local secondary school student on a part-time basis to monitor and service their network. Since then they had experienced few major technical problems.

Five of the eight teachers interviewed in 2002 said they had no problems getting Project Rorohiko set up in their classrooms. One teacher said they had to make minor structural modifications to accommodate the ICT equipment but this did not impede the implementation process. One teacher said that there were initial minor teething problems. It did take a while for students to get used to networked computers and having to use passwords. One teacher had had difficulties because the school's network did not work properly.

No major organisational changes were needed to accommodate Project Rorohiko in the schools, apart from some minimal changes to class timetables.

Financial implications

Three principals in 2002 said their schools had to meet additional costs for the project over and above the funding received from the Ministry of Education. In one school, the classrooms were not designed to take computers, so the school had to pay for building adjustments to accommodate them. In another, the costs, which the school met, were for extra network cabling, Internet charges, and for a staff member to be released from class to help set up the network. The third school also paid to release a teacher to provide technical support.

Professional development

Professional development for teachers was not as structured in this aspect of KAWM, as it was, for example, the ICT professional development associated with the Laptop programme. However, Learning Technology Facilitators were funded to provide professional development opportunities for teachers in these clusters. There was some flexibility in the professional development programme schools could embark on. Some of the schools participated in professional development prior to KAWM as part of their own ICT strategy and as part of the school's professional development programme. Some schools in the cluster were part of EDUNET and participated in professional development programmes facilitated by them. One of the principals said that ICT professional development had been an integral part of their school development programme for the past 6 years, and that training had increased teachers' use of ICT and improved their knowledge and ability before KAWM. Staff at this school had attended ICT conferences.

Involvement in Project Rorohiko

Key roles and responsibilities

In 2002 and early 2003 most of the Kiwa schools had, or were in the process of appointing, a lead ICT person who was responsible for the overall day-to-day running of Project Rorohiko within their respective schools. In terms of integration of the ICT equipment into the school curriculum one school had an ICT team made up of three classroom teachers, the deputy principal, the principal, and the computer technician. (This school employed their own computer technician.) One principal was responsible for the operation of ICT in his school. The main role of the other principals was to provide support for the person who was responsible for the day-to-day running of the project.

When we interviewed principals in 2002, three said the key role of the ICT technician in their schools was to provide ICT technical support. These principals considered this role to be absolutely crucial to the project. The fourth principal did not comment. The only suggested improvement to this role was for greater funding so that more technicians could be employed.

In 2003, the role of the KAWM ICT technician varied in the Kiwa schools we visited. One principal said that they played an advisory role, rather than hands-on. Another principal said that the technician had supported them in a range of ICT professional development and training which included supporting their lead ICT teacher so that he was able to help other staff members with any technical issues. One principal said the technicians were called upon when they needed them for problems such as technical breakdowns. One principal said that they did not use the KAWM technician as much since they employed their own technician. The KAWM technician was only called in to deal with the KAWM server. This principal said that the KAWM technicians were not servicing their school in a timely way. When they were at their school he said most often they were not able to fix the technical problems immediately which would leave the computers not working for days.

Overall, the Kiwa principals still considered the role of the KAWM technician valuable for the KAWM project, particularly for those schools that do not have an ICT manager or their own technician. When we asked what they thought could improve the role of the technician they suggested that the technicians receive more support and have their hours extended so that they could service their area better, or that each school be provided with their own technician.

Equipment

The amount and type of ICT equipment the Kiwa schools had after Project Rorohiko varied depending on the computer configuration the school was set up with.[18] School 1 had one computer for every three students, one computer for each teacher, five file servers, and other ICT equipment. School 2 had approximately one computer for every eight students, one server, and a variety of other ICT equipment including printers and a scanner. There were some technical difficulties setting up this school network because two different systems had to be merged. School 3 had approximately one computer for every three students, one server, and a variety of other ICT equipment including printers, and a CD server. The principal at School 3 said they were satisfied with the network system and had learnt how to overcome minor technical problems on their own. School 4 had approximately one computer for every five students, two servers, and printers. The network system often crashed, but worked well when it was operating. The three new schools in 2003 each had one computer for three students, a server, and a variety of other ICT equipment such as a data projector, printers, and a scanner.

Most schools used Microsoft software such as Word, Excel, Publisher, and PowerPoint.

Most of the Kiwa teachers we interviewed in 2003 said they had received new equipment or resources in their classrooms that year. Two teachers received new computers (fat clients); one teacher received a new printer. Several teachers received new software which included Adobe PhotoShop, maths, reading, and spelling games, and two teachers had new ClipArt CDs. None of the teachers we interviewed were able to confirm if the equipment was purchased through KAWM funding.

Ongoing professional development support

While the provision of professional development was not a formal part of this aspect of KAWM as mentioned earlier, the Kiwa principals we interviewed all said that access to ongoing professional development and training support was not a problem. Most principals commented that they had good access to both the KAWM technician and support for their staff training needs. Some principals suggested that ongoing professional development or ICT training often occurred within their own schools as staff would share ideas or help each other. Two principals said that their staff had also attended polytechnic or university ICT courses. At one of these schools all the staff had completed a Diploma in ICT Teaching. This school had also contracted a local ICT professional to provide ongoing professional development. Two principals said they received

[18] There are three computer configurations: 1 – Computer pod which consists of five thin client computers; one server; one UPS; one laser printer; and if the school was not already networked they also received a port hub and associated Cat 5 cabling. 2 – Computer suite which consists of 25–30 thin client computers; one server; one CD server; one UPS; one laser printer; and two x 16-port hubs and associated Cat 5 cabling (if not networked). 3 – Publishing suite which consists of one multimedia computer; one A3 colour printer; one scanner; one CD-writer; one digital camera and digital imaging and graphics software.

professional development through the Lighthouse teacher programme. This initiative has a particular focus on the pedagogies involved in the effective use of ICT in the classroom.

School ICT initiatives and priorities

The schools' ICT priorities varied. They included getting more software such as Classroom Manager, developing their own school Intranet, and developing the individual ICT skills of students and staff. Software was the highest priority area in terms of spending at the Kiwa schools, followed by technical support then hardware, and lastly, training in ICT.

Three of the six principals we interviewed in 2003 said that their schools were not involved in any particular initiatives to support the development of shared curriculum resources. There was little inter-school teaching and sharing of knowledge directly related to ICT use in the class occurring at the Kiwa schools we visited. One school had a group of 2–3 maths teachers who met regularly and shared ideas with each other. This was an initiative that the teachers themselves directed and co-ordinated.

Impact of Project Rorohiko on Kiwa schools

Attitudes towards ICT

Attitudes towards ICT appear to have improved as a result of Project Rorohiko. Three principals who had been positive in 2002, remained so in 2003. Of the six principals interviewed in 2003, one principal said that the resources staff used had changed the culture of teaching at the school, particularly amongst older teachers. Another said that staff were more confident and competent in their ICT use. Two principals attributed positive change in their staff to Project Rorohiko. Another sourced positive change to their work as a result of EDUNET rather than Project Rorohiko itself.

Although we did not interview the same teachers each year, most of the teachers we interviewed in 2003 said they remained as positive about ICT as they were at the beginning of the project and saw it as an important way to increase learning opportunities for students. The majority of the teachers said that their students had positive attitudes towards ICT and more so now that many of them are confident users of ICT in the classroom. One of the teachers in one of the schools new to the evaluation in 2003, said his students were always asking him "Why haven't we got computers?" before their school was involved in the KAWM project. Now they have computers and he can't keep them off them. Another teacher commented that students were now teaching their parents to use computers. An example of change given by one teacher was that she thought her students had a high level of ICT literacy and were now integrating ICT into their learning vocabulary. She said that the novelty of such things as games, pictures, and making borders, has given way to more in-depth research and interaction with online learning sites. Another teacher said her new entrant students are arriving at school with basic skills in using the mouse and operating computers. Because they are familiar with the basics she said it enhances their

confidence in using computers, which she also believes helps them to develop positive attitudes about ICT.

Principals' views of the impact

In 2002 most principals said that ICT was used in the following areas at least two times a week:

- school management staff in their administration tasks;
- teachers in their administration tasks;
- teachers communicating with peers at other schools;
- teachers planning their lessons;
- teachers using ICT to locate resources for lessons; and
- teachers using ICT in classroom lessons.

Two principals said that while there were no obvious new ways in which the KAWM ICT equipment had been used in their schools in 2003 they thought there was a lot more use. One other principal commented that the KAWM ICT was used more by all teachers in 2003 whereas previously many teachers did not often use the KAWM equipment, mainly because they did not have the expertise. From late 2002 many teachers in this school were involved in some form of ICT professional development. Now all teachers used the equipment in their classrooms. When the principals of the new schools were asked to reflect on use of ICT they also commented that teachers used ICT more often. One principal said that he thought the teachers were "intensifying" their skills and use of ICT, so that rather than learning a lot of new things they were consolidating what they already knew and becoming expert at that.

Another principal commented upon the more effective use of the Internet. The principal observed that teachers were drawing on a wider range of resources when planning their lessons and using the system better for effective student use of the Internet. For example, rather than students surfing to locate information, they were given more defined spaces to go to which gave them a greater focus on scanning and reading information off the screen.

One commonly expressed concern was the lack of professional development for teachers aimed specifically at improved learning for students using ICT.

Wider use of ICT facilities

The use of school ICT facilities by the wider community appeared to be minimal. Three of the six Kiwa principals we interviewed in 2003 said that their wider school communities currently did not use the KAWM ICT equipment. One school was asked to hold a local community computer course but not enough people were interested in doing the course. Two principals said that their KAWM ICT equipment was used by some of the parent supporters from the Tu Tangata[19]

[19] The people involved with this programme work in the school to provide whānau/family support to the students and teachers both in and out of the classroom.

programme, mainly for administration. Two parents were using the computers to help them with assignments; one parent was doing a teacher aide course and the other parent was doing an early childhood course.

Learning and pedagogy

In 2002, we asked the principals what significant opportunities for students had been provided by involvement in KAWM. Three of them focused on computer literacy, in the context of associating computers with new skills and new knowledge. These three thought Project Rorohiko had had a positive effect on their students in relation to computer literacy, mentioning growing confidence and easier access, therefore more opportunities to practise skills. They thought student achievement was improved, with one citing increased length of written work "from some reluctant students, from two lines to a page, it's nice and easy". Teachers were beginning to focus on the integration of ICT into their teaching. One principal thought that ICT was purely a tool, to be integrated into the main thrusts of numeracy and literacy. This principal was not sure that the school's participation in Project Rorohiko had had any effect on student performance in relation to numeracy and literacy.

The views of three principals re-interviewed in 2003 were consistent with the previous year. They continued to identify improving computer literacy as one very important outcome of being involved in KAWM. One principal said that literacy and numeracy were two key areas where outcomes for students were important and ICT played a key role in this. One principal did not highlight ICT specifically as an important outcome for his students. He believed that high academic achievement, positive social behaviour, and growing strong emotionally were important outcomes for his students. He did not say if, or how, ICT factored into these outcomes.

Most of the principals we interviewed in 2003 agreed that greater access to ICT meant that they were able to work towards helping their students achieve greater computer literacy. Since their involvement with the KAWM project students have had much more opportunity to work with computers and so to develop a range of ICT-related publishing skills. There was a belief by a number of principals that this access and skill building has been motivational for students and has added to their interest in learning.

All the principals we interviewed said that there have definitely been changes in teaching practice as a result of involvement in the KAWM project. Three principals said their teachers had become more skilled in the use of ICT and had integrated ICT across the curriculum, thus increasing their scope of resources. Another principal also said that since his teachers have had access to ICT in their classrooms they have moved away from more traditional pedagogy. Use of PowerPoint to deliver lessons and getting students to access information from alternative sources such as the Internet and Encarta were common changes that had occurred. One principal said that her teachers have adopted more co-operative learning styles where the students who are confident on the computers can help their peers who are not so comfortable or confident using computers.

The teachers appeared to be more cautious about recognising changes in their own teaching practice. While ICT has changed the way some teachers teach, most said it has not changed the way they think about teaching and learning in general. ICT is seen as just another learning and teaching tool. However, there was some recognition that teachers' increase in ICT expertise was enabling them to use the technology more usefully. In 2003 a number of teachers, for example, mentioned the development of strategies to help students locate and process information from the Internet. The teachers said that, rather than the students surfing the Internet to locate information, they mostly directed their students to specific websites. Some teachers put hyperlinks to particular sites in folders that students could access and click on and another teacher taught her students the skills of Boolean searching to narrow down their searches. Some teachers allowed students to use their own search strategies, but directed them to a site if they thought the students were having trouble finding information.

Many of the Kiwa teachers believed that the best uses of ICT in their classrooms included PowerPoint, use of digital cameras, access to Internet resources, educational games, and presentation of students' work. The majority of the Kiwa teachers said they used the ICT equipment in their classrooms regularly (at least three times a week) to teach subjects such as maths, reading, English, and computer studies. Some teachers often used PowerPoint to deliver lessons or to show diagrams to students. One teacher said PowerPoint was useful because he could store the presentation in a folder which students could access later if they needed to use it for an assignment. Some teachers expected their students to publish their work on the computers, so they incorporated ICT publishing and editing activities into their lessons. Most teachers also integrated activities into their lessons that required students to access and gather information from the Internet and/or CD ROMs. Some of the junior school teachers we interviewed said they used software or educational games (such as Maths Invaders) to supplement their students' learning.

Most of the Kiwa teachers believed that ICT added value to their students' learning because it has allowed them to edit their work more easily. Many teachers believed this gave their students a sense of achievement, because they had completed the work independently. One teacher believed that ICT added value to her students' learning because it was an exciting media for them to work with which she believed encouraged their motivation to learn. Another teacher believed that ICT gave students another learning option, which she believed added value to their learning because students do not get as bored as they sometimes did with traditional teaching methods. Overall, teachers' comments about classroom use of ICT generally focused on the technical, on skills being learnt, and on the use of ICT in motivating students to complete the set tasks. There were very few mentions of its use as a vehicle to promote learning in specific areas of the curriculum.

Many teachers said they had not changed the nature of the way they assess their students but rather the strategies used. For example, some teachers set computer-based tests for students to complete so students might have to type their answers in Word rather than write them on a piece of paper. One Year 9 teacher said they often used online templates as test or exam sheets, which again is a change in administration rather than in the nature of the actual assessment.

The majority of teachers believed that their students had become more engaged in their learning with ICT. Some teachers believed this was because their levels of confidence in using ICT had increased.

ICT in teaching and learning

Classroom use of ICT in 2002/2003

Prior to Project Rorohiko, ICT was commonly used in the four Kiwa cluster schools sampled, but not by students. Games were the main reported student use of ICT, and students had some experience of information retrieval using the Internet. In 2002 teachers reported an increase in the kinds of activities that students were using ICT for. Activities included word processing new material and hand-written material, using PowerPoint, retrieving and reading information from the Internet, and using graphics. Overall, the main uses of ICT were for presentation of student work, and gathering information for use in student work.

In late 2003 most teachers we interviewed in the Kiwa cluster said that their students were frequently using ICT and most were having daily use of computers at school. Over 2 years of the project the common uses of computers in the classroom had been for word processing (both creating new material and copying from hand-written material), reading and retrieving material from the Internet, creating PowerPoint presentations, playing educational games, and graphics. The teachers reported that the use of the computer for email and analysing data (for example, creating graphs) was relatively consistent over both years and that there had been an increase in playing games for fun and using simulation programs in 2003.

When we asked the Kiwa teachers how their students used ICT to gather information on the Internet they said they mostly directed their students to websites; however, they also used strategies such as games they developed to help the students improve their search skills.

Some teachers believed that their students processed Internet information very well while other teachers believed their students assumed that once they had the information they did not have to do anything more with it. Most of the teachers we interviewed said they had a number of strategies to determine if students understood the content of the information they found and also if they could determine its relevance. These ways include questioning, for example, “How does the information you gathered relate to what you want to ask or what you want to talk about?” The teachers also discussed with the student how they found the information, how useful it was, and whether or not it served their purpose. One teacher encouraged his students to ask “Where does the site come from?” when they were looking at sites in order to have his students think more critically about information in general. He taught them to look for things to verify information; for example, if there was no name to reference they should question the validity of the information.

Students' experiences of classroom ICT use

In 2002 we observed seven lessons. Three involved Year 5 classes, one Years 7–8, two Year 9 classes, and a multi-level Years 11–13 class. The classes generally consisted of a small group using computers on their own, and a larger group not using computers, and working more with the teacher. The main use of ICT within these lessons was publishing, largely for presentation purposes, and locating and retrieving information from the Internet. While the use of the ICT appeared to be the primary focus of the lessons, two involved publishing a poem, and one involved word processing a story. In one lesson ICT was in the background rather than the foreground and this involved the use of a CD ROM with a program designed to assist students' reading. Overall, levels of engagement by the students in all these lessons were high. One notable exception was the students who were given a single website to use to locate and copy information on a part of a plant, which did not seem to interest them. More than half the students also used computers at home, primarily for games and the Internet.

During our visits to the schools in 2003 we observed classes using ICT and we interviewed groups of students. One group was junior students (Years 2–6), one Years 7–8, and the other senior students (Years 9–13). The classes observed included mathematics and language at Years 2–6; mathematics and computing at Years 7–8; and computing and media studies at Years 9–13.

The main activities the junior (Years 2–6) students enjoyed were the maths games, which were used by the teachers for problem-solving. We observed students playing two games—Batters Up and Maths Invaders. Some students said they enjoyed using the computers this way because the maths questions were challenging and it helped them to do their maths equations. Some students said they enjoyed using the computers to learn different things. One of the Year 6 students said it was a fun way of learning. Another said:

> What I enjoyed is that it's actually a learning lesson and not games. The subjects, some of them are my favourite topics and when you're on a computer nobody has to see your work.

The junior students said some of the most interesting things that they had done on the computers in class included drawing and painting pictures, writing letters, going onto the Internet to find information and pictures, typing and pasting pictures into Word, playing games, and using Microsoft Publisher to insert pictures and borders into a Word document.

Most of the junior students said they had a computer at home. The best things they had done on their computers at home included playing games and surfing the Internet.

Junior students thought using the computers had helped them in the lessons because it had helped them to learn more computer skills. These included skills such as how to save work, how to use the keyboard and new functions on the toolbars. Some students said making shapes had helped them to learn about reflections and tessellations. Many of the Kiwa students thought that using the computers had helped them with their spelling because Word indicated when they spelt a word wrongly and they could correct it. Some of the Year 5 students who were playing maths games on the computers said that using the computers this way had helped them to learn their fractions and

decimals. Most of the students who were accessing information on the Internet said that using the computers that way had helped them to find information they needed for their reports.

The main activities the Years 7–8 students used the computers for included word processing, using spreadsheets, and doing problem-solving activities.

When we asked the students what they enjoyed most about the lessons we observed they said creating graphs in Excel, working with different types of graphs, filling the graphs in with different colours, making up stories, and pasting pictures from ClipArt into their stories.

Some of the best things the Years 7–8 students thought they had done in class included creating graphs and inserting pictures and photos into Word documents. Finding information on the Internet, learning how to use the Internet, and creating PowerPoint presentations were also enjoyed by the students.

The students used computers at home for activities such as playing games, watching movies and finding information on Encarta, surfing the Internet, practising maths, drawing pictures, sending emails, and writing letters to friends and family. When we asked the Years 7–8 students how they thought using the computers had helped them with their lessons most of them said it had helped them understand what they were being taught; for example, they had a better understanding of what some of the Excel commands could do, and they were able to practise how they could change the appearance of their graphs. One student who was writing a story said using the computers had helped her "let her ideas out and use big words".

The senior students (Years 9–13) used the computers for editing videos, practising Internet searching skills (for example, Boolean searches), surfing the Internet, creating/maintaining websites and web challenges (for example, using DreamWeaver), analysing and presenting numeric data in spreadsheets, formatting graphs and changing information in graphs, web quests, presenting work (for example, using PowerPoint, Microsoft Publisher, and Word), and web design.

The main things the senior students enjoyed about using ICT included having the freedom to work at their own pace and working on topics of their own choice, searching for information on the Internet, surfing the Internet, creating PowerPoint presentations, virtual field trips, and emailing friends, family, and peers.

Most senior students had access to computers at times other than their ICT classes; for example, most used the computers in more than one class and most said they used computers at home. The best things they thought they had done recently on the computer at home were downloading music and games, homework, and surfing the Internet.

The reasons why students believed that computers had helped them with their lessons varied. Most students believed that using the computers helped them to do their work. For some this meant being able to use Microsoft Word to type assignments and for others it helped them because they could access information from the Internet. Quick access to relevant information and

finding sources on the Internet to verify research findings were the things they found of most value in using the computers.

All students at all levels said the main thing they did not like about using the computers was that they were often too slow and they "freeze". Some senior students said they did not like doing research on the computers when they had to pay to print material off.

Summary

- Project Rorohiko provided schools in the Kiwa cluster with "thin client" networks and technical and professional support. The principals joined Project Rorohiko as it was viewed as an opportunity for their schools to get sufficient hardware and expert support so that they could advance their ICT provision.
- In all the schools visited in this cluster, attitudes to ICT use in classrooms were generally positive at the beginning and end of the evaluation. The use of computers in classrooms was commonly viewed by both principals and many teachers as a tool that served to motivate and engage students by providing a greater variety of experiences.
- As the teachers became more experienced they extended their ICT use from administration tasks to activities that support their classroom programmes. The addition of new programs, such as Adobe Photoshop, has assisted this as has their own expertise with searching and retrieval via the Internet.
- In 2003 it was evident that teachers were more aware of the support they needed to provide students to locate and then effectively use the information found.
- Changes in classroom use were evident over the 2-year period as the students became more confident and skilled in their use of ICT. The students were using ICT more frequently and learning new skills in areas such as word processing, researching using the Internet, and presenting and publishing their work. There was evidence of increased sophistication in the applications being used and in their more purposeful use. In the junior school, for example, maths and spelling programmes were being supported through ICT. In Years 9–13, students were beginning to use ICT for more than publishing or surfing the Internet, with web design and graphing being activities mentioned in 2003.
- Looking ahead, the research data suggests more professional development that specifically targets ways of integrating ICT into everyday teaching needs to be explored. Currently, while access to computers is viewed by some principals and teachers as supporting the development of computer literacy and as a motivational tool for students, ways in which computers might be used to support learning in a range of curriculum areas have yet to be realised.
- One avenue that has currently only been developed in a limited way is the sharing of effective ICT teaching and learning strategies between teachers.
- Equipment, and access to software, are not perceived to be significant issues for schools but the technical assistance required for stable operation of the system is a continued source of concern, especially for principals.

Section Five

School-based ICT Infrastructure: Project Rorohiko – Wairoa

Introduction

The school-based ICT infrastructure is referred to as Project Rorohiko in Wairoa, as it is in Gisborne. It involves the provision of "thin client" networks and a powerful server to get a higher level of performance from recycled computers to improve student access to ICT and its use in learning. The Wairoa cluster of schools was allocated 450 computers to give a ratio of one computer to every four students and was provided with technical support and access to a Learning Technologies Facilitator.

The Wairoa schools

Of the 23 schools in the Wairoa cluster we visited six schools over an 18-month period. Four of the schools were visited in 2002 and revisited in 2003, and two were visited in 2003 only.[20] Table 6 provides background details of the schools and the data-gathering strategies used. Three of the schools were located in Wairoa itself, and the other three were located within 30 minutes' drive from Wairoa. Between 2002–2003 we interviewed six principals, 21 teachers, and 62 students. We also observed 21 classes where students were using ICT.

[20] Although we visited four of the same schools in 2002 and 2003 we did not interview the same teachers and students or observe the same classes.

Table 6 ***Wairoa cluster sample schools and data sources***

School ID	*School type*	*Decile rating*	*School roll 2002/2003*	*Interviews*		*Class observations*	
				2002	*2003*	*2002*	*2003*
One	Full Primary	3	126/144	Principal 1 Year 5 teacher 1 Years 7–8 teacher 4 Year 5 students 3 Years 7–8 students	Principal 1 Year 5–7 teacher	1 Year 5 class 1 Years 7–8 class	2 Year 5–7 classes
Two	Full Primary	1	286/285	Principal 1 Year 5 teacher 1 Year 1–8 teacher 1 Year 8 teacher 4 Year 5 students 4 Year 1–8 students 4 Year 8 students	Principal 1 Year 5–6 teacher 1 Years 7–8 teacher 2 Year 5 teachers 3 Year 8 students 2 Year 5 students	1 Year 5 class 1 Year 1–8 class 1 Year 8 class	1 Year 5 class
Three	Secondary	1	515/492	Principal 1 Year 10 teacher 1 Year 11 teacher 1 Year 13 teacher 4 Year 10 students 4 Year 11 students 4 Year 13 students	Principal 1 Year 11 teacher 1 Year 12 teacher 1 Year 13 teacher 3 Year 11 students 4 Year 12 students 2 Year 13 students	1 Year 10 class 1 Year 11 class 1 Year 13 class	1 Year 10 class 1 Year 12 class 1 Year 13 class
Four	Full Primary	1	12/6	Principal 1 Year 1–8 teacher	Principal 1 Year 8 student	1 Year 1–8 class	1 Year 1–8 class
Five	Full Primary	1	225		Principal 1 Year 5 teacher 1 Year 8 teacher 3 Year 8 students 5 Year 7 students 1 Year 5 student		1 Year 5 class 1 Year 7 class 1 Year 8 class
Six	Full Primary	3	92		Principal 1 Year 5 teacher 1 Year 8 teacher 2 Year 5 students 3 Year 7 students 2 Year 8 students		1 Year 5 class 1 Year 8 class

Project Rorohiko – Wairoa

Support given to schools in the Wairoa cluster

All the schools in the Wairoa district belong to the Wairoa KAWM cluster. The main purpose of clustering was for the schools to work together to provide ICT professional development for their teachers. Clustering was also seen as providing an opportunity for teachers to discuss and share ideas about integrating ICT into their lessons. One school was also part of the Wairoa West cluster, and another was part of the Eastland EDUNET cluster. Two of the principals said it was very important for them to be involved in a cluster relationship because their schools are geographically isolated.

The schools in the cluster were supported by a full-time technician and a full-time Learning Technology Facilitator (LTF). Some of the Wairoa cluster schools have experienced some bandwidth constraints in terms of providing high-speed Internet access. When we interviewed the Wairoa KAWM co-ordinator in late 2003 she said they were expecting all of the Wairoa cluster school network systems to be updated with broader bandwidth capabilities by the end of 2004.

Reasons for getting involved in Project Rorohiko

The principals of the four schools we visited in 2002 were asked about their reasons for getting involved in Project Rorohiko. A key reason was that it allowed greater accessibility to computers. They saw that more ICT hardware and software would allow greater use of their existing ICT equipment. Principals could also see the opportunity for their schools to benefit from the chance it would give staff to improve their ICT skills through the professional development associated with the project. Principals viewed ICT as an integral part of student learning. Being involved in Project Rorohiko, and consequently having greater accessibility to computers, was seen as a way of improving learning opportunities for students.

The situation prior to Project Rorohiko

In 2002, we interviewed teachers and principals about their attitudes towards ICT use in schools, their use of ICT in the classroom, and their school's ICT capabilities prior to Project Rorohiko. We did not ask the two schools new to the evaluation about this information in 2003, focusing just on the current impact of the project on these schools.

Attitudes towards ICT

Prior to Project Rorohiko, all four principals viewed ICT positively and with enthusiasm. There was a general belief that ICT was an essential tool for learning and teaching in the 21st century. They all believed that their own attitudes to ICT were very important in determining the success of Project Rorohiko. Two principals said they were confident in ICT use prior to Project Rorohiko; two principals said they were not. They all considered that the attitudes of their staff towards ICT were positive. All the principals interviewed said that most of their staff were confident with ICT use.

In 2002, nine teachers were interviewed about their attitudes towards ICT prior to Project Rorohiko. The majority said they had a positive attitude towards ICT. Some teachers were already passionate about using ICT as a teaching and learning tool. Only one teacher was apprehensive about Project Rorohiko mainly because they had little or no prior experience or knowledge of using ICT in the classroom in particular. The majority of the teachers we interviewed in 2003 said their attitudes about using ICT in their classrooms had continued to be positive, as they were when the project began.

In 2002 the teachers said the students generally had positive attitudes towards ICT. Three teachers said their students were very positive. One teacher said her students were keen but frustrated because there were not enough computers. Another said her students were keen but not very confident in using ICT, and one thought that ICT was a mystery to some of her students. Two primary teachers thought their students saw ICT mainly in terms of entertainment and games.

Equipment prior to Project Rorohiko

ICT was already in use before Project Rorohiko in the four schools we visited in 2002. However, the amount and type of ICT equipment the schools had prior to Project Rorohiko varied. In two schools, the ratio of computers to students was already close to the intended 1:4 ratio of Project Rorohiko, but they were not networked. One of the four schools had 28 stand-alone computers, one school had a few school office computers, and another school had 65 stand-alone computers. Microsoft Office was the main software package used. One school had a digital camera and two video cameras.

In 2002, five of the nine teachers we interviewed said they had between two and four computers in their classrooms prior to Project Rorohiko. One teacher had no classroom ICT but had access to the school computer lab. The other three teachers had no computer access.

Prior use of ICT

Prior to the project all the teachers interviewed in 2002 said they used ICT in the areas of organisation and administration. Their main uses of ICT were to organise class timetables, plan class lessons, and create student task sheets. Teachers used ICT regularly to gather teaching resources from the Internet and to visit education websites such as Te Kete Ipurangi and English Online. A few teachers had managed to integrate ICT into the preparation and delivery of their lessons. This was more difficult for those teachers who had only one or two computers in their classroom or if they had to use the computer lab.

Some teachers used email and telephone conferencing to communicate with other teachers. Most teachers did not use ICT to communicate with parents and the wider school community. When they did communicate with parents or the wider community it was mostly through conventional methods such as fax, telephone, home visits, or letters.

Seven teachers interviewed said they used a computer at home for school purposes prior to Project Rorohiko. Two teachers said they did not use their computer at home for school purposes.

Because accessibility to computers was an issue, student use of ICT prior to Project Rorohiko was sporadic. Most of the teachers interviewed said that their students' interest and engagement in these activities prior to Project Rorohiko was irregular because they had limited use of computers.

Implementing Project Rorohiko

The four principals were asked in 2002 about the implementation phase of Project Rorohiko in their schools.

Support for setting up Project Rorohiko

Two principals said they received support from outside their schools to assist with setting up Project Rorohiko. One of these schools used the Ministry of Education Financial Assistance

Scheme to help with set-up costs. The other school had employed an outside ICT technician to set up the school network. Once the network was set up the school employed their own technician. Both these technicians came from outside the school. One principal said that other than support from the KAWM technician they did not receive any support from outside sources. The fourth principal did not comment.

Once schools had decided to participate in Project Rorohiko, the next step was to get technically set up. This was a straightforward process in one school, thanks to the KAWM technician, but posed some issues for the other three schools. One principal said that the main problem with this phase was waiting for all the equipment to arrive, and then waiting for it to be installed. Another said that the implementation phase was fraught with problems. Having the KAWM technician based on their site helped this school overcome most technical difficulties. One principal said they had technical difficulties merging their existing network with the KAWM network but it was worth it to have more computers.

Four of the teachers interviewed said they had no problems getting their classrooms set up for the project. The others said it took a while for all the equipment to be installed and working properly. Some computers and servers took months to arrive and there were minor problems with the network and accessing the Internet.

Overall, there were minimal organisational changes made to accommodate Project Rorohiko into the Wairoa schools. In one school, there were small adjustments made to some class timetables to allow access to the computer suite.

Financial implications

Two of the principals interviewed said there were additional costs on top of the funding they received from the Ministry. These costs included the purchase of extra printers, costs of relieving staff who attended ICT training courses and, for the school already networked, costs associated with integrating the network systems.

The principals were aware of the need to plan for ongoing maintenance and replacement of ICT equipment. They were unsure where the funding was going to come from for this, or how they were going to manage the depreciation of ICT equipment. In 2003 the majority of the principals seemed more relaxed about the future funding of KAWM as they had heard (although unofficially at the time of our visits) that it was continuing at least in 2004. This was confirmed for 2004 by the Ministry of Education. The principals were reasonably confident that their planning for their ICT future (ongoing maintenance, replacement of equipment) was satisfactory.

Professional development

As with the Kiwa cluster, the formal provision of professional development for teachers was not part of this aspect of KAWM in the Wairoa cluster, apart from that provided by the LTF on request by schools and individual teachers. Professional development in the ICT area in these

schools was largely done as part of the ICT development they were already having before KAWM and was part of their professional development programme anyway. Some schools had only had some basic computer training and training on how to integrate their teaching using ICT. One school had purchased their own computers and other ICT equipment and had some professional development when these were introduced to the school. Another school had some staff training with EDUCA.[21] The general opinion amongst principals was that prior to the implementation of Project Rorohiko there needed to be ICT professional development and training for themselves and staff, even simply to ensure that all had the same basic technological understanding of basic equipment. They said that this would have also helped "establish" the cluster further so the benefits of being a cluster could be realised during participation in the KAWM project.

Involvement in Project Rorohiko

Key roles and responsibilities

The key role of principals in the Wairoa cluster was to make sure the ICT equipment was used in the best possible way for the students' benefit.

Most schools had someone who was responsible for the overall day-to-day responsibility of Project Rorohiko. At one school where the school roll was only 12, the principal took responsibility for the project. At larger schools this was usually the responsibility of the school technician or the head of department (ICT).

The key roles of the Learning Technology Facilitator (LTF) included helping staff to integrate the ICT equipment into their lessons and assisting staff and students to use ICT programs. The LTF was also responsible for managing ICT resources in some schools. All the principals interviewed in 2002 considered the role of the LTF valuable to the project. The only suggested improvement to this role was to add another facilitator, since the existing facilitator was not always available to individual schools when actually needed because of the high demand from the schools.

None of the Wairoa principals reported any major changes in 2003 to the role of the LTF. Most of the Wairoa principals did not consider the role of the LTF as valuable now that the project had been operating for more than 2 years and since many teachers had received ICT training and professional development, perhaps suggesting that the schools are "maturing" in their ICT skill/confidence/capability.

The role of the ICT technician was mainly providing technical support such as setting up the thin client server, making sure the network is operating as it should be, and maintaining the ICT equipment. All the principals interviewed considered this role valuable to the project. There was little change to the role of the ICT technician in the Wairoa cluster over the 18-month period of our evaluation. The ICT technician was still viewed as essential for the project, especially for

[21] A private ICT training organisation.

those smaller schools that could not afford to employ an ICT teacher or technician. The only suggested improvements to this role were that it be extended and that the technician be given a part-time assistant.

Equipment

The amount and type of ICT hardware and software schools had by the end of 2003 depended on the configuration the school was set up with.[22] Most of the Wairoa schools are now equipped with the basic ICT technology needed for the project to function. This includes student computers (thin clients), at least one server and one laser printer, network cabling, a digital publishing suite, and Office 2000 application software. All the computers are networked and connected to the Internet. Most of the ICT equipment that came with the project was combined with existing school equipment. Three of the six Wairoa schools we visited in 2003 received new servers from KAWM. The majority of the Wairoa teachers said they received new equipment or resources in their classrooms in 2003. Three teachers said they received a data projector, two teachers received digital cameras, and two teachers received new printers. Four teachers said they received new resources which included maths and spelling games.

By 2003 all the schools had Microsoft application programs such as Word, Excel, and PowerPoint. A secondary school was using computer-aided drawing software and some schools now have a variety of multimedia equipment.

Ongoing professional development support

All of the Wairoa principals we interviewed in 2003 said that their staff had access to ongoing professional development since the project had been operating in their schools. Four schools provided their own in-house training and professional development. Two schools were involved in ICT training courses provided by either the KAWM Learning Facilitator or an outside training organisation.

School ICT initiatives and priorities

Since their involvement in Project Rorohiko most of these six schools took the opportunity to be involved in other ICT initiatives. In 2003 these initiatives mainly involved ICT professional development for staff. One school was involved with the CISCO Networking Academy Programme, an online learning programme that teaches the principles and practices of designing, building, and maintaining computer networks.

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[22] There are three computer configurations: 1 – Computer pod which consists of five thin client computers; one server; one UPS; one laser printer; and if the school was not already networked they also received a port hub and associated Cat 5 cabling. 2 – Computer suite which consists of 25–30 thin client computers; one server; one CD server; one UPS; one laser printer; and 2 x 16-port hubs and associated Cat 5 cabling (if not networked). 3 – Publishing suite which consists of one multimedia computer; one A3 colour printer; one scanner; one CD-writer; one digital camera and digital imaging and graphics software.

One school's ICT priorities were focused on acquiring more hardware and since the project began they were able to purchase more sophisticated hardware. This school planned to keep adding to its collection of ICT equipment and purchasing more software. Another school's ICT priorities were centred on professional development for the teachers, with a focus on increasing expertise in relation to teaching and learning using ICT. In 2003, training and technical support were the two highest priorities in terms of spending, followed by the purchase of hardware and then software.

Impact of Project Rorohiko on Wairoa schools

Attitudes towards ICT

Principal and staff attitudes towards ICT remained positive throughout the project. Teachers were still excited about ICT. As one teacher said: "Brilliant. Would like to learn more!" Some principals believed that the "incidental" ICT training and professional development provided by the LTF and other agencies was a factor of change in staff attitudes towards ICT. They believed that a more "formal, thought out and planned" approach to training and professional development for teachers would see even larger gains for the teachers. One said that his staff had grown immensely in confidence and competence with ICT since the project. Another principal said that changes in attitude and confidence in his staff were due to EDUNET and its training and support. One principal thought it was hard to know if changes in attitude and confidence towards ICT could be attributed to the project.

In 2003 some teachers noted that their students were now more positive about ICT, as their levels of confidence in using ICT had grown. As one teacher said: "Students are racing to get to the computers." Teachers generally felt student levels of interest and engagement in learning had increased. Students were more focused and interested in ICT tasks they were given, and enjoyed their ICT-based learning experiences. Their attitudes towards ICT had improved as their computer skill levels and confidence with using computers increased. Many teachers also believed that their improved self-confidence also had a positive impact on their attitudes to work in general in the classroom.

Principals' views of the impact

Principals were asked how they thought ICT was being used in their schools since the implementation of Project Rorohiko. All six principals in 2003 said that ICT was used in the following areas, with an estimated frequency shown in brackets:

- school management staff in their administration tasks (daily);
- teachers in their administration tasks (daily);
- teachers seeking advice from people outside the school such as subject experts (about twice a week);
- teachers communicating with peers at other schools (weekly);
- teachers planning their lessons (most days);

- teachers using ICT to locate resources for lessons (most days);
- teachers using ICT in classroom lessons (most days); and
- students using ICT within the classroom (daily).

Three principals said that ICT was also used in the following areas:

- teachers communicating with each other within the school;
- school office staff in their administration tasks; and
- students using ICT outside the classroom; for example, in library work, study centres, wider school projects, science fairs, etc.

In late 2003, few schools were involved in the development of shared ICT-based curriculum resources. The main kind of sharing of ICT knowledge that had occurred at the Wairoa schools was through teachers sharing ICT resources and skills at their own schools.

Principals were asked what Project Rorohiko had enabled them to do in the areas of administration, communication, and teaching. Three principals who had been confident ICT users before Project Rorohiko said their use of ICT had not really changed as a result of Project Rorohiko. Two principals were using ICT for administrative purposes a great deal more than they were prior to the project. The sixth principal said that his use of ICT in this area had not increased significantly, but he had found it a lot easier to complete administrative tasks since the project began.

The Wairoa schools used their ICT equipment in a number of new ways in 2003. One of the schools we visited was involved in a movie competition. This involved students using digital cameras and videos to make a movie about their school. Another school, that had its server updated, was able to use a wider range of software programs. The new software allowed them to use a data projector in their computer class for the first time. One school had just completed designing their school web page.

Wider use of ICT facilities

Use of ICT facilities by the wider school community in schools was minimal. Two principals said that sometimes parents were involved in community workshops. Another said that some parents and members of his school's community were doing polytechnic courses, and the school was looking at allowing them to use the school's ICT facilities. One principal said that some parents and community members had done some ICT professional development with staff.

Most of the Wairoa principals said that their board of trustees members did not use the school's ICT equipment, probably because they believed they used their own computers at home for board business.

Learning and pedagogy

Most of the principals believed that high levels of competency in numeracy and literacy were an important outcome for their students. One principal also believed that important learning

outcomes for his students included that they be prepared for technological change, become life-long independent learners, and that they be able to access information from anywhere and from a range of sources. One principal also said that engagement in learning and ICT literacy was important. Another principal believed that developing students to their full potential, instilling pride and self-respect, were important outcomes for their students.

Most of the Wairoa principals believed that there had been positive effects from KAWM for their students in relation to what they believed were important outcomes for them. One principal said because KAWM had brought ICT into their lives, students were now asking parents to buy computers for use at home. This principal believed that having a computer at home enhanced what students learn at school because they have access to the computer more often and can improve skills, and in some cases, they are able to follow up at home work they enjoyed at school. Another principal said that having computers contributed to an improvement in literacy, because the particular software being used supported children's skill development and it provided opportunities for success. One principal said that because their school was involved in ICT professional development and now had greater access to computers they had been able to capitalise on the equipment to develop active learning strategies using ICT. Two principals also believed that their participation in Project Rorohiko helped students' growing ability in locating information and being more selective in ICT use.

The Wairoa principals reported that there had been changes in teaching practices in their schools as a result of their school's participation in the KAWM project. Initially, many of the ICT-based activities were related to developing skills in using programs such as Microsoft Word and PowerPoint. However, ICT use in the classroom was beginning to focus more on information literacy and the essential skills, providing an independent tool for student learning. Most principals believed that their staff were using a wider range of curriculum resources and different teaching styles. One principal said the main change she had noticed in teaching practice was in the way teachers were using ICT in class as well as presenting information to students in more exciting ways; for example, using PowerPoint presentations and being more creative with the presentation of information and worksheets that are printed and handed out to students.

Three principals thought students were making better use of ICT, with one mentioning research in particular. One thought some students were already achieving at a higher level than they had previously. Two others thought that because the students were more engaged in learning the potential was there for higher achievement.

In 2003 the technology available had provided students with new learning opportunities. Students at two of the Wairoa schools learnt how to make movies in 2003 through the use of a KAWM laptop and a video camera purchased through school funds. For one of these schools this involved a competition where students using digital cameras and videos had to make a movie about their school. The movies were judged and an awards ceremony was held. Two schools were using data projectors in their ICT classes, and although the projectors were not purchased through KAWM funding, they would not have been able to use them if they did not have the KAWM equipment in

their schools. Another school which had its server updated was able to use a wider range of software programs giving them the opportunity to use a data projector in their school for the first time. Some schools were beginning to design their own school web pages.

We asked teachers if their involvement in Project Rorohiko had changed the way they think about the subjects they teach and/or teaching in general and the way they assessed their students. The answers given were consistent with that reported by the Kiwa teachers. There had been some changes in the ways teachers used ICT to prepare and deliver their lessons. Some teachers found that the use of ICT saved preparation time because they could quickly access a wider variety of teaching resources. The majority of teachers said they had not significantly changed the way they think about the subjects they teach. Most of the teachers we interviewed said they had accepted that ICT was another tool they and their students could use. The way teachers assessed their students in terms of the nature of the assessment task had not changed. There have been some changes, however, to the methods of administering assessments. One teacher said her students saved their work onto a network and she marked it online. Another designed part of a test that the students had to complete on a computer.

The majority of teachers interviewed generally believed that their students had become more engaged in their learning with ICT. Some teachers believed this was because their levels of confidence in using ICT had increased. Others said it was possibly because they enjoyed using computers. While most teachers believed that students' performance in terms of use of ICT had increased, the majority said they currently did not have evidence that this increase in ICT expertise was contributing in a significant way to students' learning in other curriculum areas.

ICT in teaching and learning

Classroom use of ICT in 2002/2003

The teachers interviewed in 2002 reported irregular use of ICT in their classrooms before Project Rorohiko. By late 2002 all but one of the teachers within the Wairoa sample were using ICT daily. Teachers reported a greater use of the Internet, more use of ICT to analyse data, more drill and practise, and the use of PowerPoint and word processing to create new material. There was no increase in the use of spreadsheets, simulations, or watching graphical presentations of concepts, uses which tap the particular strengths of ICT rather than offer a faster or neater tool to undertake "traditional" tasks.

In late 2003 most teachers believed that their students were making frequent use of ICT in the classroom, with some students having daily access to computers at school. Over the 2 years of the KAWM evaluation the common uses of ICT were word processing (for example, story writing), information retrieval using the Internet, reading information on the Internet, downloading music or pictures from the Internet, and for graphics. Uses that increased from 2002 to 2003 were email, games, and drill and practice exercises. Uses such as presenting information using PowerPoint,

analysing data (for example, creating graphs), and spreadsheets remained constant over the 2 years.

Most of the teachers we interviewed considered research and access to information on the Internet to be the best use of ICT in their classroom. The ways the Wairoa students used ICT to gather information depended on their class level. Most of the junior school teachers said they would more than often direct students to websites while the middle-school and senior teachers said they would often allow their students to search for information on their own.

A concern for many of the teachers was that once students had located and accessed information they did not know how to deal with it next. Most of the teachers we interviewed said they discussed with their students how they found the information, how useful it was, and whether or not it served their purpose. They also said that they checked how well they processed information by asking them questions related to the information they had gathered, or they would have their students rewrite the information in their own words.

All the teachers believed that ICT has added value to their students' learning; for example, in ways such as being able to edit their work much more easily. They can have a draft copy and go back and write another until they complete a final copy. Many teachers believed that this gave their students a sense of achievement, that they had done it all on their own. One teacher believed that ICT added value to her students' learning because it was an exciting media for them to work with which she believed encouraged their motivation to learn. Another teacher believed that ICT gave students another learning option that she believed added value to their learning because it added variety to their experiences.

Some teachers also mentioned that they thought the Internet had made it easier for students who were weak in reading to access information for themselves. Some believed that many computer-based exercises added value to their students' learning because they helped them to develop their spelling, grammar, and maths skills. A few teachers mentioned that having access to online information motivated their students to learn which they believed added value to their students' learning in general.

Students' experiences of classroom ICT use

In the first year of the evaluation eight ICT lessons were observed: two Year 5 classes, one Years 1–8; one Years 7–8; and one at each of Year 10, 11, and 13. The purpose of the Year 10 class was explicitly to improve students' keyboard skills for desktop publishing. All the other classes too had a primary focus on the acquisition and practise of ICT skills, particularly word processing and presentation, through the use of word processing, drawing tools, PowerPoint, and cutting and pasting of images. This focus on skills seemed to be typical of the 2002 activities we observed. It was interesting that students in some classes were still writing stories by hand before word processing them. There were few examples where a curriculum area was in the foreground, such as in the Year 11 class where the students were using Microsoft Word, Publisher, and the Internet

to plan a design for a school magazine. One lesson was the final lesson in a series of science tasks but the students' focus was mainly on word processing and using WordArt.

Most students enjoyed their use of ICT, though their levels of engagement in tasks varied, with no clear patterns associated with any one kind of task: in some classes, there was a low level of engagement with PowerPoint tasks, for example, and in others, it was high. This suggests the need for more in-depth observation and discussion with teachers about the kinds of tasks they set students over the course of a term or year, to see if engagement is related to different levels of challenge, and different purposes. Most of the activities which students said they had enjoyed were related to acquisition of skills, rather than particular projects or creation of products, with the exception of the creation of a website, a video, magazine, toothpaste box, and theatre performance. This may have been because the students recognised that there were more skills they needed to acquire and wanted to "complete the whole lot".

It is interesting that ICT use was not uniformly welcomed by the students. In every class there were one or two students who would prefer to do some activities off the computer. Typing was a barrier for some. For others, there was a preference to create their own art, through their own hands.

During our visits to the schools in 2003 we observed classes using ICT and we interviewed groups of students. One group was junior students (Years 2–6), one Years 7–8, and the other senior students (Years 9–12). The classes observed included mathematics and language at Years 2–6; mathematics, English, social studies, and computing at Years 7–8; and English and computing at Years 9–13.

The main things the students in Years 2–6 enjoyed about using computers in the lessons we observed included playing the maths games (problem-solving), learning how to present their work in different ways using functions in Microsoft Word and PowerPoint, writing stories, and finding information on the Internet.

Some of the junior students said they used computers at home. The best things they had done on their computers at home included searching the Internet to find answers for homework, playing games, and using WordArt.

While some students said that they found something difficult about using the computers during the lessons we observed, their problems were not concerned with using the computers but rather in trying to solve maths equations and work out how to spell words.

Most of the junior students we interviewed believed that using the computers in class had helped them with their lesson in some way. Some said they helped because they got to practise their maths skills. Many students believed that using computers helped them with their spelling because Microsoft Word underlines spelling mistakes in red so they can see where they have made a mistake and they can correct it. Having access to information from the Internet and other resources such as Encarta also helped with their reports and assignments.

The Years 7–8 students used ICT in similar ways to the junior students although we observed the Years 7–8 students undertaking more numeracy- and literacy-based tasks. Examples of these tasks included word challenges and problem-solving activities using maths games. The best things they enjoyed about using the computers in the class included searching the Internet for information, making graphs and PowerPoint presentations, typing, finding pictures and inserting them into documents (usually their stories), and word challenges.

Some of the Years 7–8 students used computers at home. The things they had done recently at home included playing computer games, doing homework, and surfing the Internet.

All of the Years 7–8 students we interviewed said that using the computers in the class had helped them with their lesson or task. They said that using the computers for word processing (for example, writing stories) was helpful to them because it showed them when they had made a spelling mistake and allowed them to present their work neatly. They said they could not have accessed the information they had gathered from the Internet for their projects because they did not have the resources in their school library. Using the computers had saved them time searching for information and had also given them access to information that was not readily available to them.

The senior students (Years 9–13) used Microsoft Publisher for designing information brochures and pamphlets, making birthday cards, writing newsletters, designing CD covers, etc. Another common use was PowerPoint where many students had created slides to present information. The main difference in use of PowerPoint between the Years 7–8 students and the senior students was that they made more complicated uses of PowerPoint. Their slides were more sophisticated containing more words, the expression of more of their own ideas, and more pictures and photos. The technological presentation was also more complex using a variety of different ways of "showing" the information.

Most of the students believed that using the computers in class had helped them to make their work much more presentable and tidy. Some students said it helped with their spelling and editing their work.

Students who had used computers recently in other classes/subjects said the most interesting things they had done recently included creating websites, publishing newsletters, practising typing skills using a tool called typing master, and burning songs onto a CD in music class. Some of the senior students had computers at home. Most of them said the things they had done recently were playing games and surfing the Internet.

Summary

- Project Rorohiko in Wairoa involved a cluster of schools supported by ICT professional development and, as with Kiwa, the schools were provided with "thin client" networks.

- While there were difficulties in the implementation phase for a number of schools, these had been solved by 2003. There were concerns by some principals about the ability of their schools to maintain and replace ICT equipment and a belief that continued additional support from the Ministry of Education would be required. Another common concern was continued access to immediate technical assistance.
- Principals and teachers had positive attitudes to ICT and its use both for administrative and teaching and learning purposes. In retrospect the principals thought that the uptake of ICT by teachers would have been faster if there had been a more formal professional development programme. However, it was evident that each school had recognised the importance of professional development and a range of opportunities had been provided for staff.
- Principals reported the teachers were beginning to use a wider range of teaching activities using ICT, moving beyond introducing students to how to use a particular software package, to how it might be applied within a range of curriculum areas. The students used ICT in a range of ways and at various levels of sophistication. Some common uses were word processing, carrying out research using the Internet, email, analysing data, downloading pictures or music from the Internet, and for graphics.
- In 2002 many of the lessons observed involved developing skills in using ICT, or using ICT for word processing or for presenting work well. In 2003 a more diverse range of ICT curriculum-related activities was evident, such as within the context of numeracy and literacy. It was also evident that teachers had begun to devise a range of strategies to assist students to locate and purposefully use information from the Internet.
- Principals and teachers reported that students were motivated by their use of ICT and in 2003 reported that they were more skilled in its use. Research was one area that some principals thought students were demonstrating greater expertise in the application of their ICT-related skills. At this stage it was felt that access to ICT was adding important value to learning opportunities but that currently there was no evidence for how it might be affecting students' actual learning in other curriculum areas.

Section Six

Evaluation of KAWM

This report has described the use of the KAWM provisions in 2002 and 2003 in wharekura, Paerangi schools, and the Kiwa and Wairoa clusters. It described the KAWM experience for each of the clusters and analysed the impacts the aspects of KAWM have had on the clusters.

In this section, we return to the first three key questions guiding our research, in relation to the aims of KAWM, to provide an evaluation of KAWM as outlined in the original research proposal. They are:

1. What use is being made of the four aspects of KAWM?
2. What are the relationships between the uses being made of KAWM and aspects of schools, students, teachers, professional development, and community?
3. What are the factors that will allow the best use of KAWM?

In Section Seven we will address the fourth question:

4. What implications can be drawn from this for the future?

This section will provide an analysis of the KAWM model for general issues around e-learning development in New Zealand schools.

What use is being made of the four aspects of KAWM?

The online classrooms

Reasons for involvement

Online classrooms, using video conferencing, were established in wharekura and Paerangi schools for a mix of the following reasons:

- *TO OFFER A WIDER CURRICULUM TO SENIOR STUDENTS*

The online classrooms were allowing secondary-level students to access a growing range of curriculum subjects they could not otherwise have taken, or, for wharekura students, not in te reo Māori. Te Kura Ataata provided six subjects in 2002 (Years 11 and 13 History, Year 11 mathematics, Year 11 science, Year 12 computing, and Year 11 art) and eight subjects in 2003 (NCEA Level 1 and 2 mathematics, NCEA Level 1 history, NCEA Level 1 science, Years 12 and 13 computing, NCEA Level 1 art, and University Level 2 te reo Māori). Te Kura Hiko provided Year 11 music and Years 11 and 12 computing in 2002, and 10 Correspondence School courses plus music and computing in 2003. The online classrooms were regarded positively by teachers, students, and principals.

- *TO ADDRESS AN EXISTING NEED*

Prior to the KAWM project the wharekura movement had identified the increasing need for senior subject specialist teachers in wharekura as kura kaupapa Māori extended into wharekura. They had begun to look at ways of building this capability in their schools and were keen to see if video conferencing was an opportunity to do this, as they had already begun to consider the notion of itinerant senior subject specialist teachers.

- *TO PROVIDE NEW OPPORTUNITIES FOR TEACHERS AND STUDENTS*

The principals saw the opportunity to gain more equipment and training for teachers by being involved in KAWM. Many teachers from both the wharekura and Paerangi schools were participating in the *Te Hiringa i te Mahara* professional development programme and principals who saw the positive outcomes of this participation were keen to build on it. They wanted more learning opportunities that upskilled and confident teachers could provide for their students with an increased use of technology.

The vast array of equipment received by the schools represented a substantial capital injection for the majority of the schools, particularly those with the online classrooms. Some schools purchased additional equipment to complement the equipment they already had, such as multimedia equipment. Many of the staff received training to use this equipment and this engendered a "keenness" to upskill themselves further with other technologies.

- *TO DEVELOP AND EXTEND RELATIONSHIPS BETWEEN STUDENTS, STAFF, AND SCHOOLS*

Video conferencing provided a "tremendous" opportunity for students and teachers to develop and build new and to extend existing social, professional, cultural, and sporting relationships with other wharekura and Paerangi schools. A prime example of this was the video conferencing of the 2003 Ngā Manu Kōrero hui from Palmerston North to many of the schools and wharekura around the country, enabling students back at school to support their schoolmates at the hui by singing their "waiata tautoko" (support song). Video conferencing was also being used for more regular communication between principals of the Paerangi schools. Some schools were beginning to use

video conferencing for professional development. A possible future use of the video conferencing equipment was for communication with parents of boarding students. Schools were beginning to see a need to develop protocols and policies for the equipment to be used with wider communities.

Use of the online classroom

- *THE CLASSES*

For wharekura the online classroom (Te Kura Ataata) involved an e-teacher located at one wharekura teaching a number of students located at other wharekura (offsite students). The teacher may also have had some students from his or her own wharekura in the classroom as well (onsite students). The e-teacher usually taught the subject in the online classroom for four or five periods per week. The participation levels of wharekura in video conferencing varied over the 3 years of KAWM but not significantly. Some wharekura, who were keen to participate initially, decided after monitoring their students' progress in the online classes that they would like to take time to consider, and possibly address some of the unforeseen issues that arose in the early years. These include:

- the need for a supervising teacher in the offsite class;
- the need to have face-to-face hui between the offsite students and the e-teacher;
- workload issues for the e-teacher;
- timetabling issues; and
- technological issues.

For the Paerangi schools the online classroom (Te Kura Hiko) most often involved an e-teacher from The Correspondence School teaching a number of offsite students at various Paerangi and other schools for a tutorial session one period per week. For the remainder of the week the students worked independently on the text-based resources provided by The Correspondence School. During 2002 and 2003 Te Kura Hiko also included two Paerangi e-teachers teaching two subjects to a combination of offsite and onsite students. The participation rate of the Paerangi schools in Te Kura Hiko was consistent during the KAWM evaluation, particularly with The Correspondence School. The Paerangi schools "jumped on board" once The Correspondence School began to offer courses with a weekly video conference tutorial, as it did not impact on their own teaching staff and offered weekly contact with their distance teacher. An unanticipated outcome from the project was the successful use of a mixture of synchronous and asynchronous communication tools. The Paerangi schools found this learner-centred approach was working well with their students as the student completion of set work and assignments has increased.

- *THE KAWM CO-ORDINATOR*

The organisation and facilitation of the development of the online classes was achieved by the KAWM co-ordinator in each of the clusters, particularly in setting timetables and ongoing liaison between the schools. This required face-to-face meetings with teachers and principals of all

schools in the cluster and with technicians. The co-ordinators also organised and facilitated professional development for teachers. These tasks were considered to be vital to the ongoing uptake of online lessons, and all principals agreed that the KAWM co-ordinators' role was necessary and important in the management of the KAWM project in their schools.

- *THE TEACHERS*

One of the major challenges for the e-teachers was an increase in workload because of the difference in nature of teaching in a conventional classroom and an online classroom. For the wharekura teachers, this was somewhat alleviated by the provision of grants from the Ministry of Education, allowing wharekura to support the e-teachers in a range of ways. For example, by:

- increasing the number of e-teachers in individual wharekura to help share the load and provide onsite collegial professional support;
- developing formal ways for e-teachers from all wharekura to meet and communicate regularly online;
- developing protocols to ensure that e-teachers meet with their students prior to online classes beginning and at various other times through the school year;
- providing extra preparation time for the e-teacher in acknowledgement of the difference in learning resource requirements for online students;
- providing support personnel in each online classroom onsite with the e-teacher (plus additional non-contact time) to liaise with the students and co-ordinate the distribution and collection of teaching materials and assignments and other operational tasks;
- developing "in-kura" training for the development of learning resources for use in online lessons; and
- establishing and developing a database of online resources for use in online classrooms.

The Paerangi teachers also had concerns about workload initially. However the use of The Correspondence School online tutorial system for many of the Paerangi students meant that workload demands were not so great for the schools involved. If Paerangi schools are to increase their own online classroom provision in the future, ways to support this need to be considered. The lessons learned by the wharekura e-teachers will be valuable in this.

The teachers have found that online teaching differs from conventional teaching in a number of ways. The teachers need to plan ahead more in their preparation to allow time to distribute teaching materials and assignments to offsite students. The lessons need to be more structured to account for the technology and distance. Teachers lose some flexibility as they must account for the entire period with a task or an activity to ensure there is no "down" time which is harder to monitor at a distance than in a person-to-person situation. A support teacher in the class can help in these instances. The students and the teachers miss the immediacy of person-to-person contact both inside and outside the classroom and so must spend time building relationships and "knowing" every student in their class, which is more difficult from a distance. To help address

this issue, some schools found value in having hui for the online classrooms at the beginning of the year to enable the online teachers and students to meet and establish relationships.

There was little evidence of differences between the two online classrooms—Te Kura Ataata in wharekura and Te Kura Hiko in Paerangi schools—using synchronous forms of communication, in terms of the approach and views of teachers or the response of students to their lessons. However, the emergence of the practice of using a combination of synchronous and asynchronous tools is proving to be an adequate solution to the problem of a limited senior curriculum without impacting too heavily on staffing.

- *THE STUDENTS*

Students in online classrooms appreciated and valued that video conferencing enabled them to broaden their curriculum choices and gave them the opportunity to develop and build relationships with other students and teachers. They enjoyed the "different" nature of video conferencing, particularly the technology, learning from another teacher, and learning with other students from other schools.

The students became frustrated with technical problems with the equipment and were concerned about the nature of the teacher-student interactions created by the distance aspect of video conferencing. They prefer the immediacy of responses with an onsite teacher. They said the ideal online classroom would involve:

- a hui to meet their online teacher prior to and during the teaching year;
- a supervising teacher/tutor in their offsite classroom; and
- equipment and technology that did not fail.

The challenges of the online classroom

- *TIMETABLING*

In order to facilitate video conferencing across a number of schools there needed to be a shared timetable between the schools. This was ultimately achieved by the KAWM co-ordinator for each cluster of schools. Schools had to accommodate a video conferencing timetable alongside their individual school timetables. In some cases this was problematic as it involved students leaving regular school classes to attend a video conference class. At a daily operational level, video conference classes were subject to the same disruptions as regular school classes, however the distance aspect of video conferencing meant that communication about such disruptions is crucial. E-teachers commented that disruptions to an online class were more severe than to other classes because of the preparation involved and the larger number of offsite people involved who are "put out".

- *STAFFING*

The wharekura are trying a number of ways to increase the capability and capacity in their schools to address the senior specialist subject teacher shortage. Video conferencing is one way of doing

this; however, the transition from conventional teacher to e-teacher is not necessarily straightforward. Many believed providing pedagogical training alongside technical training would improve the overall skill base of the e-teacher. A competent e-teacher has participated in professional development programmes that are pedagogically and technologically based, and has access to further training on a "needs required" basis.

The Paerangi schools found staffing in terms of providing e-teachers to teach senior school subjects has not been a major issue for them as they are participating in The Correspondence School online tutorial system, although they do provide supervising teachers for these classes.

For wharekura the necessity to provide a teacher to supervise the offsite online students places a burden on schools that are already struggling with staffing difficulties. However, some schools are turning this "negative into a plus" by using the supervision as a professional development opportunity for the supervising teacher. The supervising teacher has been able to learn content knowledge from the e-teacher and observe teaching practice.

The "happy" e-teacher functions within a network of support systems. These include support from:

- the school principal;
- the KAWM co-ordinator;
- an offsite supervising teacher;
- an onsite administrative support teacher; and
- a technician.

Teachers rely on their principals for leadership, guidance, and motivation. The e-teachers said they had to feel they were valued for their work and relied on key people within their support systems to do this. The principal as the school leader, and often visionary in terms of ICT development, was one such important person.

Similarly the KAWM co-ordinator provided support in a more managerial and operational role.

Support in the online classroom at their site was needed to provide administrative and operational support for the e-teacher, carrying out tasks such as liaising with the offsite students, and co-ordinating the distribution and collection of assignment work.

A supervising teacher was required to support students who used the video conferencing facilities for social interaction, and students relied on the goodwill of their teachers for this to happen. One Paerangi school appointed a staff member to manage the online classroom/facility onsite.

The e-teachers worked with various systems of technical support, from an onsite presence at the teachers' "beck and call" to offsite technicians and waiting for 3 days for a technician to turn up. The overwhelming request from the e-teachers was for onsite technical support at each school to support the many ICT initiatives schools were participating in.

- *QUALITY OUTCOMES FOR STUDENTS*

While the principals of all the schools hoped that video conferencing may improve the educational achievement of their students, ways of measuring this had not been set up at the beginning of the project so they were unable to actually determine this. They were relying on anecdotal information from teachers, students, and parents and often seemed to be confusing participation with quality learning outcomes. Arguably, however, participation is a positive learning outcome if a student would otherwise have been denied these learning opportunities through a lack of access.

- *SUSTAINABILITY*

While the principals expressed concerns about future funding of the programme, improved understanding about the funding for the KAWM project enabled principals to think about different ways the money could be used to achieve their goals. They were taking the time to rethink and strategise about ways to ensure the longer-term success of the online classroom based on their practice and experience to date. They were considering:

- the support for the e-teacher from a kaiāwhina in the classroom for all online lessons, as well as in the operational area of liaising with offsite students;
- the availability of appropriate online learning resources for the e-teacher and the students;
- the optimal numbers of offsite and onsite students in any one online classroom;
- the learning value for onsite students in an online classroom;
- the impacts of onsite students on the e-teacher;
- the best pedagogical approaches for Māori students in the online classroom; and
- the difference in pedagogy between curriculum areas for the online classroom.

- *TECHNOLOGY*

The schools found that technical support in the maintenance and repair of the equipment was critical for successful implementation of the online classroom, and access to this support needs to be immediate. Also there were limitations because of the technology itself. Some of these technical limitations that arose in the first 3 years were addressed; for example, the purchase of the new bridge by the Ministry of Education. However, there is a continued need for technical assistance for maintenance and ongoing development, and a standard of technology available to all schools in New Zealand that all schools can rely on.

Despite the barriers and challenges, the principals, teachers, and students we interviewed believed that the value and benefits of Te Kura Ataata and Te Kura Hiko far outweighed any barriers. For example, if it were not for Te Kura Ataata, wharekura would not be able to offer their students a diversity of subjects in te reo Māori. Similarly Te Kura Hiko has provided this opportunity for Paerangi students and also to explore distance methodologies that suited their students, such as the combination of synchronous and asynchronous tools.

The Wharekura Expert Teachers' initiative

The number of e-teachers is growing, as is the range of subjects being offered. While the training provided teachers with the technical skills in using the video conferencing equipment, it did not provide the opportunity for the teachers to integrate their pedagogical knowledge of teaching their particular curriculum area with the technology, nor to provide ways to use ICT as a tool to facilitate learning. Many teachers' early experiences as e-teachers were not positive because of this.

There are a number of workload issues for the wharekura e-teachers, particularly in the management of the offsite online class and development of online resources in te reo Māori. Some schools are beginning to alleviate these with strategies such as providing a person to manage the liaison with the offsite students and providing support in resource development and production. The schools were using the experiences of their e-teachers to inform this process and to also develop ways of "growing and looking after" these teachers.

Despite there not being an equivalent initiative for the Paerangi schools, the number of e-teachers being trained in these schools is increasing. Of course, because Paerangi schools are able to teach their students in English, they are able to access The Correspondence School courses and to date this has met their needs without impacting too heavily on school staffing.

The Wharekura Expert Teachers' initiative provided a pathway allowing wharekura to grow their own capability and capacity in the area of senior subject teachers. The funding provided in the form of e-teacher grants and the Te Kura Ataata Grant gave wharekura the flexibility and financial resources to explore ways to do this, allowing schools to find both collective and individual solutions. In this way this initiative has been more successful than having itinerant teachers as the investment stays in the school.

The laptops and ICT professional development for teachers

The aim of the programme

The aim of the Laptop programme was to build teachers' fluency in the use of information and communication technologies, particularly the computer and the Internet.

Participation

By participating in this programme, teachers were able to learn how to use the laptop as a tool to reduce their workload and thus give more attention to teaching. The teachers from the wharekura and Paerangi schools participated in this aspect of KAWM, and generally the laptops were now taken for granted by these teachers, as they are used daily, in and out of school.

Networking

The teachers all reported using their laptops for communication and forming and maintaining networks. There are indicators that some teachers are beginning to share ideas and resources between schools, but currently this is an underdeveloped professional development strategy.

Impact on teachers and teaching

The personal use of a laptop computer and the associated professional development has enabled teachers to plan, research, and communicate more efficiently. They are able to access resources and assessment tasks online, create and share resources, communicate using email with a network of colleagues, plan and write lessons at home, and accomplish a range of administration tasks efficiently. However, the ongoing value of access to a laptop and the associated training will only be seen if opportunities are sought, or provided, to extend the teachers' use of ICT, particularly in the context of teaching and learning in their specific curriculum areas.

The principals commented that staff were more confident as a result of acquiring more ICT skills through participating in the Laptop programme. The teachers themselves felt more valued and many commented their commitment to teaching had increased. Many teachers used their laptops in their classes and would like to see senior students have access to personal laptops and associated training.

School-based ICT infrastructure

Purpose

This aspect of KAWM involves the provision of "thin-client" networks in all clusters, using a powerful server in each school. The wharekura and Paerangi schools were provided with networks to support the online classroom by providing a mechanism to allow the transfer of files between teachers and students. The Kiwa and Wairoa clusters were provided with networks to improve student access to ICT and its use in learning.

Use and impact

The school-based ICT infrastructure made a difference in schools, improving processes and opportunities for students to interact with ICT, despite a number of technological problems identified by most schools.

The thin client networks were used for school and teacher management tasks, preparation of resources and lessons, and by students. In 2002 ICT was mainly used as a "tool" in classes in much the same way as a print-based resource, rather than as an opportunity for interactive learning. However, student use of ICT in classrooms increased and over the course of the evaluation there was evidence that classroom ICT use was becoming more sophisticated, particularly in terms of the range of software programs and the multimedia equipment being used.

Access to the Internet and the ability to publish work in a variety of professional-looking formats also has a strong symbolic value that enabled teachers and students to feel more connected to the world outside school.

The students' increased use of ICT appeared to have a positive effect on their confidence and motivation and the teachers have seen an increase in ICT-related skills associated with this. The students had a greater variety of ICT experiences and were willing to be more flexible in their use of ICT and to "try new things".

Challenges

The challenges for schools and teachers in all clusters with the school-based ICT infrastructure centre around the standard and reliability of the technology, and the availability of personnel to support the technology and the teachers. These areas have been variable across the clusters and have determined the successful or otherwise use of the networks.

In cases where the use of the networks for the transfer of files between video conferencing teachers and students in wharekura and the Paerangi schools was limited, this was because of the limitations of the technology itself and the lack of a personnel structure to ensure the effective use of the network as well as to support its ongoing development.

The potential exists to educate teachers so that they are better able to integrate the technology into their teaching in ways that build upon knowledge of learners and learning; for example, teaching that involves group-based activities, and uses purposefully selected software or computer-based resources to help address identified gaps in the current understanding of individual students. The potential also exists to include training for whānau and community.

What are the relationships between the uses being made of KAWM and aspects of schools, students, teachers, professional development, and community?

Schools

The online classrooms worked only if schools were co-ordinated, and prepared to change their individual timetables to form a common timetable, at least for the scheduled online lessons. It was also essential to provide supervising teachers in the classes in sites other than the online teacher's school, which created some issues, given that staffing shortages were one of the reasons for developing online classes.

Schools became aware as the project proceeded that whakawhanaungatanga (relationship building) hui for the online students and their e-teachers was critical for the success of the online classroom, and many schools were facilitating these hui at various times of the year.

One impact on schools was the extra work involved in gaining a substantial amount of equipment and its maintenance and upkeep. However, all the principals agreed that these workload issues were mainly related to the implementation process and most had been worked through.

A major task for schools has been to "keep track" of the project as a whole. While there are co-ordinators and technical support people and principals as the overall leaders in the schools, the ability to hold the overview has been difficult, particularly when schools are involved in more than one ICT or educational initiative. One principal, for example, believed that keeping up with technological and software changes was an extra job for him. From an administrative point he believed the workload of keeping their networks running was difficult and some of his teachers became frustrated when they were not working properly. The provision of a KAWM co-ordinator in the wharekura and Paerangi clusters made an important contribution to project administration.

For some schools participation in the KAWM project meant additional costs over and above the money provided by the Ministry of Education. For other schools, the additional costs were minimal. The majority of boards of trustees had included the new equipment on their asset registers and were budgeting for depreciation.

Some of the Paerangi schools and the wharekura used the online classroom as a way of extending their social relationships, sometimes between Paerangi schools, or between wharekura but also between wharekura and Paerangi schools. Sometimes the students who met in the online classroom used the video conferencing facility to interact socially from a distance, or the online relationship was further built upon when they met in person at sporting or kapa haka events.

Students

Students appeared interested and motivated in the online classes and acknowledged the role video conferencing has played in broadening their curriculum. The students participating in the online classrooms were positive about video conferencing and enjoyed:

- the teachers, believing they learned a lot from their online teachers, and they learned subjects they may not otherwise be learning;
- the sharing of ideas and "whakawhanaungatanga" (building relationships) amongst the students and teachers at different sites;
- the "different" nature of learning via video conferencing, particularly the technology, but also the difference to a conventional classroom;
- the ability to link with overseas sites; and
- the opportunity to communicate with other students on a more "social" basis.

The students in the online classrooms were not so happy about:

- the lack of face-to-face interactions with the teacher and the delay in response time; that is, a less personal relationship with the teacher; and
- the inadequacy of the technology.

The wharekura students' ideal online classroom would be one in which:

- they were either onsite with the e-teacher or offsite with excellent supervision (a tutor who had some curriculum knowledge in the area of the subject being taught); and
- they had previously met the e-teacher and were beginning to develop a relationship.

The Paerangi students' ideal online classroom would be the one above or one in which:

- they had a tutorial at least once a week with their Correspondence School teacher;
- they were provided with the resources to continue study at their own pace for the remainder of the week; and
- they had previously met their e-teacher and were beginning to develop a relationship.

The majority of teachers in all the clusters commented that positive impacts of the KAWM ICT on most of the students included:

- providing the opportunity for students to develop ICT skills and good research skills, including information searching and retrieval;
- motivation;
- giving students more access to resources;
- improvements in students' spelling and grammar;
- feelings of being up-to-date with the technology and not being left behind;
- improvements in confidence and self-esteem from being able to use the technology; and
- an increase in confidence leading to an improvement in attitude to work.

Teachers

The impact of the technology in the KAWM project has been major for teachers. The vast majority have required training to use the equipment and often the training that would have impacted most on the students, that is, pedagogically based training, did not occur.

The e-teachers had workload issues, with concerns that the "lived reality" of being online impacted too much on other aspects of their professional and personal lives. However, the Wharekura Expert Teachers' initiative and the grants to wharekura associated with this enabled wharekura to deal with some of the workload issues facing the e-teachers.

The e-teachers did not take long to realise that teaching online is very different from teaching in a conventional classroom. They had to plan much further ahead than they were used to, and be very well organised. They had to create learning resources for use in the online classroom and needed time to gather and judge the merits of them, as well as ensure they were written in te reo Māori. This led to ideas such as a database of excellent online learning resources available to all e-teachers, and also the practice of videoing online lessons.

Teachers generally enjoyed their own and their students' better access to ICT, and wanted to use it. Many teachers believe that the use of ICT with classroom programmes served to motivate and

engage students by providing a greater variety of experiences. Students seemed to prefer a mix of ICT, either on the computer or through online classes, and conventional classroom activities for their learning.

Professional development

Professional development was most ample for the teachers who had laptops, even though they expressed concerns about the structure of the professional development. It was acknowledged that this professional development programme was developed from an earlier successful model used with Māori secondary school teachers.

The online teachers thought they needed ongoing professional development, and to have more professional "learning" conversations with each other to share their growing knowledge, and problem solve the issues associated with a different role from traditional face-to-face teaching; for example, discussions around ways to interact with students who are not at the teacher's own school. Professional development is regarded as key in the research literature to teachers being able to make the most of ICT (Windschitl & Sahl, 2002; NFIE, 2000). It is difficult to see how the teachers in the networked schools would be able to move to uses of ICT which expand learning and teaching in new ways without it.

Teachers talked about having the opportunity to have professional development on a "needs basis" and considered the KAWM co-ordinator a person crucial to the identification and even the facilitation of such professional development.

Inter-school collaboration was focused on professional development, common timetables, and for the wharekura and Paerangi schools, an extension of existing student events and communication between principals. The KAWM equipment was beginning to be used to establish communication between the hostel staff of the Paerangi schools. These all provided opportunities for dialogue about school-related professional issues.

Community

By the end of 2003, community uses of KAWM initiatives were limited to whānau and boards of trustees. There were signs that because these were ICT initiatives, which are in themselves symbolic of belonging to a "knowledge society" and "the future", they affirmed the value of the schools to whānau and community.

All wharekura expect more use of the equipment by the community to occur in the near future and recent examples included allowing whānau members to use the equipment for video conferencing meetings they have with people in other centres, and training for school trustees.

Similarly the Paerangi schools began to encourage the use of the video conferencing equipment by the wider school community. Board members had meetings using the equipment, teachers had video conference meetings with the Ministry of Education, and the community was invited to be

involved in the Ngā Manu Kōrero hui by video conferencing. One Paerangi school was looking to extend video conferencing into the boarding hostels, and they all participate together in principals' hui, teachers' meetings, and hostel staff hui.

What are the factors that will allow the best use of KAWM?

The evaluation of the KAWM project has indicated a number of factors that, considered together, have allowed the best use of KAWM. The discussion about each of these factors also indicates areas where improvement is needed.

Leadership

Most principals were positive about KAWM although initially some had reservations because "it came like a bolt out of the blue" and they did not have enough time to consider the long-term practicalities of the project. Many principals were happy with the promise of the equipment and technical support and committed to the project on this basis. The wharekura and Paerangi principals were keen for the opportunity to offer their senior students a broader curriculum than schools of their size were generally able to offer. Generally, the principals were keen for new learning opportunities for their staff and students but were unclear about what was expected to be achieved in the project and it took time to determine their roles and responsibilities.

Three years down the track the enthusiasm for ICT remained, although with their experience, most principals and schools were taking considered approaches to the continued development of ICT initiatives in their schools.

While one of the aims of the KAWM project was to improve student achievement, all principals agreed that it was too early in the project to know whether this had occurred. They relied on anecdotal information from staff, students, and parents about the impact of KAWM on student achievement. However, in its first few years, the project's focus was largely around implementation issues. With ICT and e-learning now becoming more integrated into school practice, further consideration was needed about how to establish useful ways of measuring the impact of e-learning on students' learning and achievement.

Overall, initiatives such as KAWM are dependent on the principal for leadership, guidance, and motivation in order for the implementation to be successful—an issue raised by a number of teachers interviewed.

School networking/clusters

There were four clusters involved in the KAWM project in this evaluation:

1. the wharekura cluster;

2. the Paerangi schools' cluster;
3. the Kiwa (Gisborne) schools' cluster; and
4. the Wairoa schools' cluster.

The clusters participated in different aspects of KAWM, however belonging to a cluster was important to most schools and probably ensured that some schools took on the initiatives where they might not have on their own. The cluster structure provided support networks for many schools, including the technical and professional support along with collegial support.

All the clusters were already established prior to KAWM; two were geographically based (Kiwa and Wairoa) and two were "kaupapa" (philosophy) based (wharekura and Paerangi schools). However, KAWM provided the opportunity for the members within each of the "kaupapa" based clusters to extend their relationships further. While these schools already had common activities where they intermingled, such as Kapa Haka and Ngā Manu Korero, the video conferencing facility allowed them to extend this relationship when they were at their respective schools.

The cluster arrangement provides the opportunity for inter-school sharing of resources and expertise. The potential for developing substantial resource banks of material in te reo Māori for use in the wharekura online classroom is beginning to be realised. However, there is a great deal more scope for building upon the existing cluster arrangements, and expanding them, to enable a more interactive relationship between teachers who are seeking to develop their knowledge of teaching and learning using ICT. Given the concern expressed by a number of the teachers about their lack of expertise regarding the use of ICT to support learning in other curriculum areas, particularly secondary teachers in terms of teaching and learning in their respective specialist areas, support for such professional development opportunities is a priority.

The cluster structure is dependent on a co-ordination role in order to be successful, and each cluster managed to implement such a position. For the wharekura and Paerangi clusters in particular regarding the online classroom the KAWM co-ordinators were invaluable for the success of the operation.

Equipment and technology

Reliable equipment was key to making the best use of KAWM initiatives. This depended on not only the quality of the equipment provided, but also on the quality of the ICT and physical environment it went into, the availability of adequate technical support, and on what people expected the equipment to be able to do. Initially, high expectations that could not be met within the expected time frame dampened some people's enthusiasm. The difficulty long term is that as more people use the equipment, the more they see potential, usually involving upgrading, or the need to purchase other software or ancillary equipment, and so their expectations exceed the resources available. Some schools that already had an established ICT infrastructure were already

in a state of "readiness" to implement another initiative, while others felt like they were always "trying to catch up".

The fact that the additional ICT equipment, and associated software, cabling, and support were largely funded by the government provided something of a levelling effect, so that while the sample KAWM schools were in different phases of implementation, ICT is now embedded in all aspects of the life of each school. The major issue now is the school's ability to maintain the current equipment and to make informed decisions about updating hardware and software. These are complex decisions as they need to take account of a variety of factors such as:

- the values and priorities of the school;
- the purposes for which the school is using ICT, for example online classes;
- financial constraints;
- the compatibility with a wider network without compromising the school-based initiative and the expertise of teachers; and
- the availability of technical and professional support.

Technical support

Technical support was available to all schools but immediacy of access to it became an issue for schools, even the schools that are not remote. Those schools that hosted the cluster technician were definitely at an advantage and after 3 years most schools thought all schools should have access to technical support on their own site at all times.

Professional support

Professional support provided by the KAWM co-ordinator or the Learning Technologies Facilitator/ICT Lead Teacher was another pivotal factor in the success of KAWM in schools. The KAWM co-ordinator position was developed after one year of the project with principals and teachers clearly indicating the need for the position. Since their appointments the KAWM co-ordinators streamlined the organisation in schools, including the provision of the shared timetables. Similarly, the LTF/ICT Lead Teacher provided professional development and technical support for some teachers, and while some schools in the Kiwa cluster did not see an ongoing need for this position, they acknowledged that they still needed a provider of professional development and technical support.

Professional development and training

To make the most of KAWM, it will be important to address ongoing professional development, beyond a skills focus and into teaching and learning. Training for the online teachers provided them with the technical skills in using the video conferencing equipment. It did not provide the opportunity for the teachers to develop their pedagogical content knowledge in the context of ICT.

The teachers who had the use of the laptops said the professional development they had was more than adequate as they learned how to use the laptop as a "tool" to download resources, prepare lessons and reports, and communicate with other teachers. They also said the opportunity needs to be taken to extend this to include integrating ICT as a learning resource. The teachers who had the thin client networks in their classrooms have also argued that they need a concerted professional development programme to support their attempts to integrate ICT into their teaching.

Associated with this recognised need for knowledge about how to use ICT to support learning is concern about having the time and expertise to select new software that best suits the needs of the teachers themselves and their students. In looking for future levers to support ongoing ICT development, there is an important opportunity offered by the fact that many teachers are now clearly "ready" for professional support for using ICT for learning. David Hargreaves (2003), in a paper that outlines possible ways of transforming secondary schools through innovation networks, argues that:

> Classroom teachers do not want to become experts in the use of ICT, and most are not interested in improving their ICT skills in a general way; instead they want to be e-teachers of physics or French, mathematics or music, and if ICTs will help them teach these subjects better they will use them for this overriding purpose, which is at the heart of transformation (p. 43).

Summary

The impact of the four aspects of KAWM has been variable across the four clusters:

- wharekura and Paerangi students have accessed a wider curriculum via the video conferencing initiatives;
- wharekura and Paerangi teachers have developed ICT skills and fluency that positively impact on their workload from participating in the Laptop programme; and
- students and teachers from all clusters have improved ICT skills from an increase in ICT experiences.

Projects such as KAWM provide schools with a "kick-start" that gives them a large amount of equipment and technology and associated training and support to allow them to enter the digital learning age. The challenge is to strategise ways to maintain the momentum, to move from simply considering access to equipment and technology as a means to an end, and to begin to consider the range of ICT experiences students could experience and how to bring these to the classroom to impact on their learning.

The issues and common concerns can be grouped in the following way:

CURRICULUM AND PEDAGOGICAL ISSUES

- Specific training and professional development for teachers to improve ICT practices.
- Professional development to understand and learn pedagogies that best suit the e-learner.

- Understanding that change from current or conventional practice is needed to provide for the e-learner.
- Support for e-teachers, from other e-teachers, technicians, and schools.
- Strategies for sharing resources and expertise.

ICT INFRASTRUCTURE

- Standards of technologies.
- Availability of technologies.
- Sustainability (maintenance and updating) of software and hardware.

EDUCATIONAL ADMINISTRATION

- A co-ordinated approach to the development of a framework for e-learning in New Zealand, informed by research and best practice.

Such a framework would need to achieve a balance between centralised decision making to support e-learning development in all schools, and schools' roles and responsibilities to self-manage in order to:

- meet their own educational goals and priorities; and
- develop approaches to curriculum and pedagogy that are appropriate to the schools' underlying educational philosophies and/or the specific needs of their learners.

Section Seven

Lessons from KAWM for Future e-learning Development in New Zealand Schools

This section provides a second level of analysis of this research. In Section Six we evaluated the KAWM project based on three research questions and the aims of the project. In this section we draw from the KAWM research findings to address the fourth research question: What implications can be drawn from this for the future?

This will occur in two parts. Firstly we highlight some direct messages that teachers, principals, professional development providers, and policy makers can draw from the KAWM evaluation. We suggest some indicators that could be used to estimate schools' progress towards the integration of e-learning in school practice. Finally, we will discuss the implications of the findings from this evaluation for informing future e-learning policy and practice in New Zealand. This discussion will centre around the three main areas of concern highlighted at the end of Section Six:

- curriculum and pedagogy;
- ICT infrastructure; and
- education administration.

Messages from the KAWM evaluation for teachers, principals, professional development providers, and policy makers

The following messages for teachers, principals, professional development providers, and policy makers represent a sample of some of the important findings to emerge from the KAWM evaluation. Many of these messages are relevant for all of these audiences. To avoid repetition, we have ordered these messages according to which audience we think they are *most* relevant. However, we intend these messages to be read together as a complete set, as there is a need for co-ordination between each of these audiences to avoid individual "silos" operating in the area of e-learning.

Messages for teachers

Teaching and learning in the online classroom

- The successful video conference class relies on an excellent teacher with whom the students have a relationship, and who is able to provide a variety of learning opportunities within the online classroom.
- Distance teaching, as in the online class, is different from teaching in a conventional class and different approaches are needed. Consideration must be given about how to develop relationships between teachers and students at a distance and how to ensure teaching materials are available to offsite students when they are needed.
- Many of the indicators of a good online lesson are the same as for a good conventional lesson, for example, high levels of student engagement, and high quality student questions. Consideration must be given to how to support these qualities of teaching and learning in an online environment.
- Team teaching has worked successfully in some online classes. This approach allows e-teachers to share knowledge and collaborate in curriculum development for courses.
- Experienced e-teachers are a valuable source of training and insight about online pedagogy for new e-teachers.
- Supervising students in an online class, or observing or video recording e-teachers as they teach their online class, can be a professional development opportunity for the supervising teachers.

Teaching with ICT

- Over time, as teachers' and students' expertise with the technology grows, more sophisticated uses of ICT in the classroom can occur.
- As students make greater use of ICT in class, teachers need to develop strategies to support and extend students' learning appropriately. For example, some KAWM teachers developed strategies to determine if students understood the content and relevance of the information they obtained from the Internet.

Messages for principals

Staffing for e-learning

- Supervising teachers are needed to supervise students in an online class taught by an offsite teacher.
- E-teachers benefit greatly from the support of a teacher aide who can assist with preparation of teaching materials, liaison with offsite students, and other administrative work associated with teaching at a distance.

School timetabling and professional development considerations

- The facilitation of a "wananga" for the entire online class is important to build relationships between online and supervising teachers, students, and support staff.
- The duration of online classes may need rethinking. Some classes may require longer than a conventional class period, because of the extra time involved in managing the technology, and communicating at a distance. This may have implications for school timetabling.
- With the appropriate support structures in place, schools can develop their own "in-house" training, and expertise in resource development, teacher training strategies, and curriculum delivery strategies.
- Team teaching, and collaborative course development between e-teachers, requires good relationships and communication systems between these teachers, and sufficient planning time available for them to do this.
- Principals should consider ways to take greater advantage of staff professional development opportunities available through video conferencing (for example, when supervising teachers are able to observe another teacher teaching online). Teachers would also benefit from opportunities to share and observe lessons and teaching strategies that other teachers have developed which make good use of ICT.

Infrastructure to support e-learning

- Students rely on the constant and consistent operation of the technology for their online classes to be successful.
- Rooms and buildings used for video conferencing classes must be adequate (for example, in terms of size, lighting, and ventilation).
- As teachers and students begin to make greater and more sophisticated use of ICT for teaching and learning, their needs begin to outstrip what the thin client network can provide, particularly as ICT use involves more multimedia equipment and applications.

Messages for professional development providers

- Professional development providers can support schools to develop "in-house" expertise in resource development, teacher training, and curriculum delivery strategies.
- Professional development providers could consider ways to support team teaching approaches and peer collaboration within and between schools.
- Professional development providers could help teachers to use the technology to support their professional learning, for example, through observing and video recording themselves or other e-teachers as they teach their online classes.
- In some instances, video conferencing can be used to deliver teacher professional development programmes.

Messages for policy makers

- Schools may need staff at both ends of the online classroom's video conference link; that is, to have a supervising teacher for students taught by an offsite e-teacher.
- E-teachers may require the support of a teacher aide who can assist with preparation of teaching materials, liaison with offsite students, and other administrative work associated with teaching at a distance.
- The experience of e-teachers could be used to develop models of successful practice in online pedagogy.
- There is a need to consider support for schools or school clusters to develop "in-house" training and expertise in resource development, teacher training strategies, and curriculum delivery strategies that facilitate good use of ICT. Similarly, supporting the facilitation of "wananga" for online teachers and students would serve to enhance outcomes for e-learners.
- Schools may require additional support to ensure that rooms used for video conferenced classes are adequate.
- Given that the cluster model has some clear benefits for both students and e-teachers, incentives to support schools to work in this way may be useful for further collaborative e-learning development.
- Some problems encountered in the KAWM project were not specifically about the use of ICT in teaching and learning, but stemmed from issues around the availability of te reo Māori teachers, and the inherent challenges of teaching and learning through distance education (see NZCER, 2004).

Draft indicators of progress

Progress towards e-learning needs to be viewed as a continuum, with schools moving along at different rates depending upon their individual priorities and histories. We suggest that if a school, or clusters of schools, are aiming to improve the experiences and outcomes of students through ICT-based initiatives, then the following could be seen as indicators that schools were moving towards this aim.

SCHOOL LEADERSHIP

- Principals are the ICT leaders in the school, committed to ICT being integral to all aspects of school life.
- Principals take responsibility for decisions about maintenance and development of ICT hardware and software and include these as key items in their annual planning.
- Communications and relationships are well-managed both within the school and between schools that are sharing ICT-related activities.

ADMINISTRATIVE SUPPORT

- School-wide systems are in place to ensure administration and liaison functions are carried out by a professional support team. For example, school has well-defined procedures for operating online classes with the rest of the cluster.

ICT INFRASTRUCTURE

- The ICT infrastructure is up-to-date, reliable, and able to meet the demands of general usage.

EQUIPMENT

- Technology is maintained and replaced as part of a planned programme.
- Processes are established for the provision and distribution of equipment.

TECHNICAL SUPPORT

- Systems are established where technical difficulties limit ICT use rarely; conversely, timely, and adequate technical support is available.

TEACHERS

- All routine administrative tasks are undertaken by computer.
- There is a sharing of resources and ideas within and beyond the school.
- Systems of support are in place that meet the needs of the teacher, such as technical, professional, and collegial. In the case of an online teacher, in-class support is provided.
- ICT is being integrated into teaching programmes.

STUDENTS

- Students are using ICT often, for a range of purposes, and across a range of learning contexts.
- Students' learning involves "improved opportunities" through ICT use; that is, the students' use of ICT becomes more sophisticated and there are opportunities to gradually increase knowledge, skills, and understandings in a variety of curriculum areas by using ICT.

PROFESSIONAL DEVELOPMENT

- Planned and structured programmes are established that meet the stated needs of the teachers involved.
- There is an ever-increasing proportion of the teaching staff seeking professional development related to teaching and learning using ICT.

The implications of KAWM for e-learning in New Zealand

Recent discussions among some educators, researchers, policy makers, and practitioners regarding developments in e-learning in New Zealand (Treadwell, 2004; Wenmoth, no date) have highlighted the three areas of concern noted at the end of Section Six. These three areas are: curriculum and pedagogical concerns and issues, ICT infrastructure concerns and issues, and

education administration concerns and issues. Unless these areas of concern are addressed and a point of co-ordination is developed, it has been asserted that e-learning in New Zealand will not develop to its full potential. It is within this context that the implications for future e-learning development in New Zealand will be discussed.

Curriculum and pedagogical concerns and issues

The first area of concern involves the changes in thinking about curriculum and pedagogy that are often linked to the idea of learning in a digital age. In particular, the idea that the digital age will require new ways of thinking about "knowledge" (and hence, curriculum), and a shift towards "learner-centred" rather than "teacher-centred" pedagogies. As Gilbert (2003) and other writers have noted, the fundamental shift in thinking will be from seeing knowledge as static, an artefact that can be shared and exchanged, to regarding knowledge as dynamic and evolving. For schools, this will require an increased emphasis on the processes of constructing knowledge and the skills required to do this.

The KAWM evaluation highlights the need to provide clearer transitions or links between these future-focused ideas about teaching and learning in "digital age" schools, the current curriculum, and teachers' current pedagogical practices. For the majority of KAWM teachers, their current practice has been influenced by a succession of professional development during the nineties based on new curriculum developments across all essential learning areas. The advent of information and communication technologies and the World Wide Web during this time came when teachers were already facing many changes as a result of Tomorrow's Schools. Teachers became alert to the opportunities and changes the new technologies were expected to bring about, but struggled to integrate these into their practice, and were left with few clear sources of guidance about how to do this.

The introduction of video conferencing in wharekura and Paerangi schools addressed a problem already of concern to the schools: the inability to offer senior students the full range of curriculum options. Despite the technical and organisational difficulties which affected the schools' use (or non-use) of video conferencing, wharekura and Paerangi principals believed that video conferencing had the potential to alleviate some (though not all) of the difficulties their schools faced due to their size, rurality, or special character. However, the KAWM e-teachers found that teaching at a distance from students in the online or "virtual" environment was not as simple as transferring the skills they had as a conventional teacher into the video conferencing teaching environment.

The wharekura e-teachers were confident in their abilities as teachers and in their knowledge of their curriculum areas, and they were sure that e-teaching was one way of broadening the curriculum offered to their senior students. However they felt they were "learning on the job" and were initially ill prepared to take on the role of e-teachers. Those teachers who persevered became skilled e-teachers, however this was a demanding process for the teachers, both professionally and personally. Early on, the use of synchronous communication in Te Kura Ataata classes sometimes

led to a "lecture" style of teaching. However, over time, wharekura e-teachers developed strategies for teaching in a more interactive way using synchronous communication. The Paerangi teachers also commented about the personal and professional demands associated with becoming an e-teacher. However they almost "accidentally" discovered a way to utilise the technology and broaden the curriculum without impacting heavily on staffing, through the use of The Correspondence School courses. A combination of both synchronous and asynchronous communication technologies proved successful for the Paerangi schools and students. This combination has allowed a learner-centered approach or pedagogy to sit alongside the teacher-centered pedagogy.

The e-teachers identified two areas where they needed support:

- Professional support – from other e-teachers in their cluster and other clusters to have the opportunity to share ideas and experiences; from their schools in the form of technical support; from their schools in the form of systems and processes for the administration aspects of the online classroom.
- Training and professional development – so they can understand and learn about the pedagogy of online learning and about other online technologies.

Many teachers from all the clusters who gained access to extra ICT in their schools (school-based ICT infrastructure) struggled to find ways to integrate ICT in their everyday teaching programmes. Initially the main goal of the schools participating in Project Rorohiko was to improve access of teachers and students to ICT. Principals believed that teachers and students needed to develop ICT skills and that ICT-related experiences would be motivating for students. As this goal was achieved, the schools began to re-define their ICT goals and were seeking ways to use ICT to promote learning across the curriculum. While one of the aims of KAWM was to improve the achievement of students, no measures for the impact of the KAWM project on student achievement have yet been undertaken, nor have clear methods for doing this yet been established. At the beginning of the project, many teachers did not know how to use ICT to contribute to learning. It is only now with the ICT infrastructure installed, and with teachers and students having sufficient ICT expertise, that the schools can begin to focus on new ways that ICT might be used to support student learning.

Many teachers from all the KAWM clusters commented that they are now ready to move on from the current situation of learning ICT skills based on the technology in their schools and clusters, to being knowledgeable and skilled in ways that ICT can contribute to student learning. The KAWM evaluation supports the need to embark on changes that will allow the transformative potential of e-learning to be realised. A key aspect of this will be to explicitly link developments and discussions about ICT and e-learning to the development of new thinking about curriculum design and pedagogy. For schools to recognise and respond to the opportunities that e-learning presents for new approaches to curriculum and pedagogy, it is critical that strong links be made between these areas at national policy level (Wenmoth, no date). For example, linking e-learning

development closely to new directions for curriculum design and pedagogy which will stem from the current New Zealand Curriculum/Marautanga Project.[23]

ICT infrastructure concerns and issues

The area of concern relates to issues of ICT infrastructure in a "networked" learning environment. The learning experiences of a networked learner depend heavily on the quality, accessibility, and reliability of the network to which they are linked, and this network comprises everything from computers and peripherals to the wires and infrastructure that link them together. Because a networked learning environment can transcend the immediate environs of the individual school, issues of standards and interoperability become relevant.

The KAWM initiative gave the schools involved sufficient support to provide a "critical mass" of hardware, software, technical, and professional support for each one of the initiatives to make a difference to the schools involved. To borrow a metaphor from science, this injection provided the "activation energy" to enable schools to be in step with today's ICT, rather than with the technology of yesterday, and has led to ICT being integral to school life.

It was evident that the ICT infrastructure enabled more sophisticated uses over time and that classroom activities were moving well beyond the basic functions of word processing – an ICT use that depends on a very low level of "networkedness". Having access to a range of more useful software, supported by additional hardware, was beginning to allow teachers and learners to do things that you can *only* do with ICT, and which depend on a more reliable and capable network. The lack of uptake of the First Class learning management system across wharekura in 2002–2003 illustrates some of the issues for schools as they seek to facilitate more "networked" learning. While a teacher in one wharekura reported using this system extensively, the system was not taken up by other wharekura for reasons including a lack of time for online teachers to continue their professional development, insufficient software knowledge, and server technical problems.

Part of the rationale for the school-based ICT infrastructure aspect was to support the students and teachers in the online classroom by having a network that allowed the sharing/sending of files between students and teachers. For the most part this function was not used for the online classes in wharekura and Paerangi schools. Many of the teachers commented that they often felt the technology itself had "let them down" more than their own skill levels. There were variations

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[23] The Ministry of Education's New Zealand Curriculum/Te Marautanga o Aotearoa Project involves a wide-ranging process to engage teachers, principals, students, lecturers, and others in revitalising the New Zealand curriculum. The goals of the project, which runs from 2004 to 2007, are to: clarify and refine outcomes; focus on quality teaching; strengthen school ownership of curriculum; and support communication and strengthen partnerships with parents/whānau and communities. For further information see http://www.tki.org.nz/e/community/nzcurriculum/

among the clusters in the technologies available; for example, the limitations brought about by the old video conference bridge. Some schools had limited access to broadband and to web-based email. Some teachers commented that they were part of a "Clayton's network"; that is, "the network you have when you don't have a network". The quality of the infrastructure was also inconsistent, varying between clusters and within clusters.

Principals and teachers commented that the current ICT infrastructure was failing to keep up with their expectations for technological integration into teaching and learning. They could not foresee being financially capable to improve this in the near future. It was suggested that there needed to be a national infrastructure in place, centrally controlled and allowing all schools participating in a networked learning environment to have the same standard of technological infrastructure.

The KAWM evaluation supports the need to define a networked learner/e-learner and develop some clarity about the nature of support such learners require. This thinking needs to take account of the limited resourcing schools have available. The technology issues will need to be addressed in a way which involves strategic and co-ordinated planning, development, and implementation that will see ICT effectively support learners.

Education administration concerns and issues

The third area of concern is the way that funding and support for schools, and the school system, are administered within the government's budget for education (Wenmoth, no date). Wenmoth suggests that changes driven by curriculum and pedagogy, together with those brought about by the introduction of ICT, will stand or fall on the extent to which they are supported by national-level decisions that will affect the nature and structure of e-learning in schools.

The KAWM evaluation included discussion about the appropriate structural arrangements needed to achieve excellent outcomes in e-learning including the roles of key players such as the Ministry of Education, the e-learning clusters, and individual schools. In every KAWM school there was comment about the role of the Ministry of Education in the project, from "joy" that it was actually happening, to "despair" about the extra workload participation entailed. The schools were grateful for the support they were receiving, however some were concerned about the ad hoc nature of the development, and schools were hoping for a co-ordinated approach to planning in the future. Schools had concerns that KAWM was "always a project" and so they found it difficult to think of KAWM as part of their "normal ongoing business".

The following concerns are those that schools thought could be addressed centrally rather than have individual schools "problem solve" their own way around these issues:

- Funding – the continuation/sustainability and level of funding and the criteria used for this.
- Technology – the ICT infrastructure currently in schools was not consistent enough to truly support the New Zealand networked learner.
- The learning environment – schools wanted furniture and teaching spaces that would enable ICT to be accommodated in every classroom.

Conclusion

The KAWM evaluation has provided an opportunity to discuss the three important areas for consideration around the notion of the networked learner/e-learner. Many useful lessons can be learned from the experiences of schools involved in this ambitious and multi-faceted e-learning initiative. However, it is also important to recognise that changes and developments in the area of e-learning in New Zealand schools are rapid and ongoing. The outcomes of initiatives like KAWM are thus partly the product of the specific time and context in which they occurred. Nevertheless, the KAWM evaluation has provided a valuable opportunity to consider the "big picture" for the future development of e-learning in New Zealand.

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Appendix A: KAWM – Research Participants 2002

School ID	Principal	Laptop tch.	Expert tch. Online tch.	Online supervising tch.	Online class observation	Online students	ICT tch.	ICT students	ICT class observation	Technician	Learning facilitator	KAWM Co-ordin.
Wharekura												✓
WK.1	1	1	–	1	1	5	2	–	–	N/A	N/A	
WK.2	1	–	–	–	–	–	1	–	–			
WK.3	1	1	1	1	1	3	–	–	–			
WK.4	1	2	–	1	1	2	3	2	2			
WK.5	1	1	1	1	1	4	–	–	–			
WK.6	1	3	2	–		–	–	3	1			
	6	***8***	***4***	***4***	***4***	***14***	***6***	***5***	***3***			
Māori boarding schools												✓
PAE.1	1	1	1	–	1	4	1	4	1	***N/A***	***N/A***	
PAE.2	1	2	–	1	1	4	–	2	1			
PAE.3	1	2	1	–	–	4	1	4	1			
	3	***5***	***2***	***1***	***2***	***12***	***2***	***10***	***3***			
Kiwa schools												
Kiwa.1	1	→					1	4	1			
Kiwa.2	1						4	12	2			
Kiwa.3	1						1	4	1			
Kiwa.4	1						2	8	2			
Kiwa.5							–	–	–			
Kiwa.6							–	–	–			
Kiwa.7							–	–	–			
							8	***28***	***6***			
Wairoa schools												
WAI.1	1	→					2	7	2			
WAI.2	1						3	12	3			
WAI.3	1						3	12	3			
WAI.4	1						1	–	1			
WAI.5							–	–	–			
WAI.6							–	–	–			
							9	***31***	***9***			

Appendix B: KAWM – Research Participants 2003

School ID	Principal	Laptop tch.	Expert tch. Online tch.	Online supervising	Online class observation	Online students	ICT tch.	ICT students	ICT class observation	Technician	Learning facilitator	KAWM co-ordin.
Wharekura												
WK.1	1	3	1	1	–	–	1	5	1	N/A	N/A	
WK.2	1	–	–	–	–	–	1	3	1			
WK.3	1	1	1	–	3	3	–	3	1			
WK.4	1	–	–	–	–	–	1	3	1			
WK.5	1	2	1	1	–	–	1	4	1			
WK.6	1	1	1	1	1	4	1	5	1			
	6	7	4	3	4	7	5	23	6			
Māori boarding schools												
PAE.1	1	2	1	–	1	–	1	4	2	N/A	N/A	
PAE.2	1	1	–	–	1	3	1	2	1			
PAE.3	1	2	–	1	–	3	2	8	3			
	3	5	1	1	2	6	4	14	6			
Kiwa schools												
Kiwa.1	1	N/A					–	–	–			
Kiwa.2	1						1	10	2			
Kiwa.3	1						3	10	3			
Kiwa.4	1						3	11	3			
Kiwa.5	1						2	8	2			
Kiwa.6	–						1	12	2			
Kiwa.7							1	2	2			
	6						11	53	14			
Wairoa schools												
WAI.1	1	N/A					1	–	2			
WAI.2	1						4	5	1			
WAI.3	1						3	9	3			
WAI.4	1						–	1	1			
WAI.5	1						2	9	3			
WAI.6	1						2	7	2			
	7						12	31	12			

Appendix C: Te Kura Ataata Video Conferencing Timetable 2003

1/2003	Mane	Turei	Wenerei	Taite	Paraire
9.30–10.30 **09:00–10.30**	**Pangarau 2 (4)** **@Waiu** TNR Arahou Aniwaniwa Te Rito	**Pangarau 2 (4)** **@Waiu** TNR Arahou Aniwaniwa Te Rito	**Pangarau 2 (4)** **@Waiu** TNR Arahou Aniwaniwa Te Rito	**Pangarau 2 (4)** **@Waiu** TNR Arahou Aniwaniwa Te Rito	Hitori 1(6) **@Whakapumau** Whānau Tahi Mana Tamariki Mangere Whakarewa Arahou
	ka watea nga tamariki				
11.00–12.30	**Pangarau 1(5)** **@Te Rito** Arowhenua Whakapumau TNR Whakarewa	**Putaiao 1(4)** Te Rito, Kahungunu, Arahou, Mana Tamariki	**Pangarau 1(5)** **@Te Rito** Arowhenua Whakapumau TNR Whakarewa	**Putaiao 1(4)** Te Rito, Kahungunu, Arahou, Mana Tamariki	**Pangarau 1(5)** **@Te Rito** Arowhenua Whakapumau TNR Whakarewa
	ka watea nga tamariki				
1.00–2.00	**Rorohiko 2(4)** **@TNR,** Arowhenua Te Rito Arahou Mangere	**Rorohiko 3(3)** **@TNR,** Arowhenua Te Rito	**Pihinga(5)** **@Waikato** Hoani TNR Whānau Tahi Aniwaniwa Kaikohe	**Pihinga(5)** **@Waikato** Whakapumau Arowhenua Te Rito Ruamata	Toi 1 (7) **@Ruamata** Arowhenua Te Rito Arahou Mana Tamariki Whakarewa Whānau Tahi
1/2003	**Mane**	**Turei**	**Wenerei**	**Taite**	**Paraire**
2.00– 3.00	**Rorohiko 2(4)** **@TNR,** Arowhenua Te Rito Arahou Mangere	**Rorohiko 3(3)** **@TNR,** Arowhenua Te Rito	**Pihinga(5)** **@Waikato** Hoani TNR Whānau Tahi Aniwaniwa Kaikohe	**Pihinga(5)** **@Waikato** Whakapumau Arowhenua Te Rito Ruamata	Toi 1 (7) **@Ruamata** Arowhenua Te Rito Arahou Mana Tamariki Whakarewa Whānau Tahi
3.30 – 4.30					

Appendix D: Paerangi Video Conferencing Timetable

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	University Māori (Hato Petera) 9–10am Waikato University			Yr 11 Graphics 9–10am (Turakina) TCS	
9:30	Yr 13 Chemistry 9.30–10am (Turakina) TCS				
10:00			**Yr 11 Accounting (Hato Petera) TCS**		
10:30					
11:00	Yr 13 (Hato Petera) Calculus TCS		Yr 13 Econ 584 (Hato Petera) TCS		Yr 11 Economics (Hato Petera) TCS
11:30			Yr 13 Computer Studies (Hato Petera) Angela Tapa–Pehi	Yr 12 Accounting (Hato Petera) 11.20am TCS	
12:00					Yr 12 Economics (Hato Petera) 12.10pm TCS
12:30			Yr 11 Agriculture (Hato Petera) TCS		
1:00				**Yr 11 Food & Nutrition (Te Aute) TCS**	Yr 12 Chemistry Hato Petera TCS
1:30		University Māori (Te Aute) 1.30–3.30pm Waikato University			
2:00			Yr 13 History Bridge 584 **(Hato Petera)** TCS	Music (Turakina) 2–4pm Hato Paora	
2:30					
3:00	University Māori (Hukarere, Turakina) 3–5pm Waikato University				
3.30				Subject Teachers Hui (Subject changes each week)	