National Education Network (NEN) Trial Extension

Evaluation Report

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PROLOGUE: SETTING THE SCENE

This report has been written within a conceptual framework that has been informed by the networked corporate and social worlds of the 21st century. A report by McKinsey and Company clearly states the importance of Web 2.0 technologies in the wider world and the extent of their use.[1] Yet, despite the changes in the world beyond the school gates, many of our classrooms remain within a 20th century paradigm. Digital technologies are in our schools. They are an essential tool for teachers, but there appears to have been little impact on schooling beyond the superficial. The core work of teaching and learning has remained essentially the same. One of the questions raised in this report is what could teaching and learning look in the 21st century with the tools now available. What could schooling be in the networked age?

In the 20th century education was essentially structured within silos formed by classrooms, timetable and content areas. This was the era of pen and paper. I would argue that in the 21st century a networked paradigm would see the use of web, and other, technologies breaking down these silos and teaching and learning being extended beyond the school gates, involving a range of people, taking place in multiple contexts (both real and virtual) and occurring across time.

Between these two paradigms is, arguably, the digital phase. Many schools have normalized the use of the digital into their practices. Indeed, for most teachers, digital technologies are an essential tool in their professional work. However, the use of digital technologies appears to have remained largely within the industrial model of education; they have replaced paper, but the paradigm has remained essentially the same. Learning still tends to be controlled by the teacher. It is still often siloed in both content and context. Digital tools are used to bring the outside world into the school, not to facilitate two-way interaction between the outside world and the learner. The digital paradigm is perhaps best described as supplementing or replacing pen and paper with digital tools.

It is this space most New Zealand schools have reached. The digital is evident in all schools to varying extents. This is due, in part, to the extensive ICTPD programme that has been in place, to the provision of laptops for teachers and to initiatives such as the School Network Upgrade Programme. The impact of these should not be devalued or underestimated. New Zealand schools have travelled a long way since 1998 when the first ICT strategy document for New Zealand schools was released with a goal of building infrastructure and school capability. However, it has been a slow journey from a paper-based world to a more digital world; a journey that has not brought the transformation in teaching and learning many hoped for. The reality is schools still lag behind the 'real' world in adopting a digital and networked approach.

This is perhaps not surprising. Education is high stakes. The future of children and of society are involved. However, given the extent of change in the world around them it would seem that schools now have to respond. They have to find a way to be relevant in the 21st century, to meet the needs of the generation before them and those to come. Flexibility, agility and openness are necessary. Disciplined innovation is needed.

This report firmly places the goal posts within a networked paradigm. It measures where schools are at on a journey that looks beyond the use of digital technologies in the classroom, to a networked

[1] Available at: http://www.mckinseyquarterly.com/The_rise_of_the_networked_enterprise_Web_20_finds_its_payday_2716

and collaborative paradigm of teaching and learning. It does not seek to demean or make light of what has been achieved to date, but to suggest that there is still much to be done. Nor does it seek to ignore the many challenges schools face in the 21st century.

While I did not expect many schools to be operating within a networked paradigm I was aware of pathfinder schools[2] that are well on their way to being networked. These schools are found in New Zealand and around the globe.[3] I thought it important to measure the success of the NEN Trial against an aspirational end state, to place the goal posts for all schools firmly in the 21st century, particularly given the role of this study within the wider Network for Learning planning.

It may be that there has been insufficient time for the schools, in this study, to move beyond the digital phase, but it is important to learn from this report – to understand that there is still much to be done. It is also important to stop and acknowledge how far schools have come but it is equally important not to lessen the reality of what is still possible in the bigger picture. For every innovative teacher, for every exciting story of 21st century learning there are many others who are still working in the 20th century. How much time is required? Are there ways to foster greater collaboration and a breaking down of silos in a way that will quicken the journey ahead? I would like to think so. The Network for Learning has the potential to be both a desired endpoint and the tool for reaching that point.

Of the NEN Trial one could question whether it has been value for money – whether it was the right thing to do. I believe it was – that there have been important learnings from this work – and that the schools involved are now in a better position to move forward. I also believe that there are implementation issues, which need to be considered. These include questions around the desired outcome from the Trial for the schools involved and the perceived benefits for their communities.

In the discussion sections of this report the opportunity to critique, challenge and reflect on the outcomes of current practices has been taken. While this is unusual in an evaluation report focussed on the impact of an initiative, I believe the role of the NEN Trial as a test bed for the N4L makes it important to view this work as a research project and to potentially develop new understandings from the study. It is hoped the report will promote discussion and reflection. I believe it is important to consider whether it is now time to do things a little differently; to perhaps focus less on the implementation of digital technologies in the classroom and more on the transformation of schooling to something relevant in the 21st century – then digital technologies would likely find a natural home.

Dr. Lorrae Ward

[2] Note these schools were not part of the NEN Trial.

[3] For further discussion on the pathfinder schools read:
Lee, M. & Ward, L. (2013). *Collaboration in Learning: Transcending the classroom walls.* ACER Press: Melbourne

1.0 EXECUTIVE SUMMARY

This report summarises the findings from the evaluation of the National Education Network Trial Extension (NEN Trial). It focuses on changes to teachers' practices and the learning experiences of their students as a result of their school's participation in the NEN Trial from July 2011 through to July 2012. Findings reported include respondent perceptions of the impact of the NEN Trial, their confidence, attitudes and values regarding digital technologies, the professional development they have experienced and the use of digital technologies in teaching and learning.

It is the latest in a series of reports focused on the NEN Trial and developed to inform the ongoing design and implementation of the Network for Learning. Data regarding the NEN Trial were collected over an 18-month period commencing in March 2011. The final surveys were implemented in July/August 2012.

The theoretical framework for this report centres on realizing the potential of digital technologies to transform the learning experiences of children; to move our schools into a 21st century, networked paradigm of operation. It is argued that the benefits of an initiative such as the Network for Learning will only be fully realised when a network of learners exists; when individuals, classes and schools are collaborating and interacting beyond the four walls of their classrooms. It is acknowledged that the extent of transformation will depend on the starting point; that what is innovative in one classroom may be business as usual in another. The high standard deviations reported in the 2011 and 2012 surveys support this.

1.1 The NEN Trial

The NEN Trial was initially implemented in 2008 with 21 Proof of Concept schools. It was then extended to 102 schools. The additional schools came from three regions: Christchurch, Nelson/Marlborough and Ashburton. The latter group of schools were the "greenfields" loop as both Christchurch and Nelson/Marlborough were already part of established regional loops. Also an established loop was the Wellington loop, whose schools were part of the Proof of Concept group.

The objectives of the NEN Trial were to better understand the policy, educational, technical and commercial issues related to the implementation of a national network for schools. Included in this was the potential transformational impact on teaching and learning practices. In this way the NEN Trial was an ideal test bed for the Network for Learning[4]. This report has been written with this purpose in mind – to inform the development of the Network for Learning.

1.2 Methodology

The data reported here were gathered through online surveys conducted in July 2011 and again in July 2012. Two sets of surveys were used: a Principal Survey and a Teacher Survey. All schools participating in the NEN Trial were sent links to both surveys and asked to participate. Regional support providers were also asked to encourage schools to participate.

In addition, two of the regional support providers were interviewed to discuss the key findings from the surveys and to gather their perspective on the success – or otherwise – of the NEN Trial. Their comments have been taken into account in the discussion section of this report.

[4] www.n4l.co.nz

1.2.1 Participants

There were 44 principal respondents and 209 teacher respondents in 2012. This was less than for the 2011 surveys. Many of the 2012 respondents were different people from those who completed the survey in 2011. This meant only a very small sample of each could be used to measure changes over time. The matched sample of teachers for 2011/2012 was 53 respondents; the matched sample of principals was 26 respondents.

The demographics of the 2012 samples and the 2011/2012 matched samples were broadly representative of the NEN Trial schools.

1.2.2 Survey design

The surveys used in 2012 were more comprehensive than those used in 2011. The three major scales, related to teaching and learning, remained the same enabling a measure of change over time. Also the same were items related to infrastructure, expected and reported impact and teacher confidence. There were a number of additional items in the 2012 survey related specifically to the impact of the NEN Trial, the professional development provided and the attitudes and values of respondents.

The response scales, in both surveys, were mostly six-point scales. In general terms they followed the same pattern e.g. 1 = not at all, 2 = very slightly, 3 = slightly, 4 = moderately, 5 = strongly, 6 =very strongly. The major exception was the response scale used to measure the use of digital technologies in teaching and learning which was specifically designed and ranged from awareness through to regular use.

1.3 Findings

Following are the key findings from the body of this report. They are reported thematically and largely according to the different sections of the report.

1.3.1 Attitudes towards digital technologies

The respondents to both surveys, on average, reported that digital technologies are important priorities, even when compared to other competing priorities for limited resources and funding. The data suggest that the value and importance of digital technologies is cumulative across a range of purposes. However, the high standard deviations across all items would suggest that there is a wide variation in attitude, something that was observed in schools visited during the NEN trial evaluation.

Respondents did report that teacher access was more important than student, in terms of both the Internet and devices. This suggests there is still a teacher-centric view in these schools. However, comments made by principals with regard to Bring Your Own Device (BYOD) and wireless connectivity suggest that they are now moving to a greater focus on student access and use. The question of which is more important – teacher or student use – is perhaps a moot one. Ideally both would have access. However, increasingly the literature suggests that the potential of digital technologies will not be realised until the technology is in the hands of students.[5] A positive from this study is that schools do seem to be focussing on student access now. The quality of that use is still to be considered.

[5] Halverson, R. & Smith, A. (2008). How new technologies have (and have not) changed teaching and learning in schools. Journal of computing in Teacher Education, 26(2), 49-54.
SRI International. (2011). Innovative Teaching and Learning Research 2011 Findings and Implications. www.itlresearch.com

Further, the use of digital technologies was seen as supporting a range of outcomes rather than being used solely for a particular purpose. Though overall levels of use for different outcomes were low, it is likely that the cumulative use of technologies - in some instances- is high. The data suggest that teachers tend to either use digital technologies or not; that the level of use is reasonably consistent across a range of outcomes.

1.3.2 ICT Infrastructure

The levels of reported satisfaction with school infrastructure are a concern with teachers reporting that they were only *slightly* to *moderately satisfied* with the infrastructure in their school. The means ranged from 3.03 to 4.24. This represented a slight trend towards an increase in satisfaction over the reported figures in 2011. The one area where a statistically significant increase was reported in satisfaction was with *student access to the Internet*. This may be due to the installation of wireless networks in a number of schools, and other improvements to school networks.

The NEN Trial provided access to ultrafast broadband to the gate and upgraded school networks where necessary. However, SNUP (School Network Upgrade Programme)[6] does not necessarily provide for ubiquitous and normalized student access to the Internet. Nor does either initiative provide for student access to the devices they need. Schools still need to enable student access and this is costly. These were the areas where teachers were least satisfied. The emphasis on wireless and BYOD in the principals' comments would suggest an awareness that student access is an issue, one which is heightened in a networked paradigm.

Student devices are paid for either by schools or by parents (BYOD schemes) or a combination of both. In some instances, schools are able to access external funding grants[7] for technology but this is not likely to be common. Others are likely to rely on the fundraising of parent organisations within their communities. It is not the place of this report to discuss this issue in detail and a description of current school funding models is beyond our brief. Suffice to say there is anecdotal evidence that the funding of technology is an issue for schools and may well remain an issue for some time, as schools grapple with the issues of equity and responsibility related to BYOD programmes.

A recent publication by Lee and Levins (2012)[8] highlights the many variations of BYOT[9] and the potential for home – school collaboration to improve student access. They suggest that BYOT is a way of pooling home and school resources but also acknowledge that schools will have to ensure those from less affluent homes are supported. It also highlights the extent to which those schools that have normalised the digital have some form of BYOD in place.

[6] For more information on this project go to: http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/Initiatives/ICTInSchools/ICTInitiativesAndProgrammes/SNUP.aspx

[7] This tends to be low decile schools.

[8] Lee, M. & Levins, M. (2012) *Bring your own technology*. ACER Press, Melbourne.

[9] Lee and Levins use the term BYOT (Bring your own technology) rather than BYOD (Bring your own device) as it is more inclusive of a wide range of technologies.

1.3.3 The impact of the NEN Trial

The findings from the 2012 surveys suggest that the NEN Trial, at best, has had a *moderate* impact on the schools that participated. The principals reported a slightly higher level of impact than the teachers. Over both surveys, the highest reported impact was for the *professional learning opportunities provided for teachers* ($\bar{x}$ =4.34) as reported by the principals.

For both groups, the reported impact in 2012 did not reach the expected levels reported in 2011. In a number of areas the reported achieved levels were statistically, significantly lower than what had been expected. Further, there does not appear to be a strong correlation between what was expected in 2011 and what was reported in 2012. It would seem that the respondents expected things of the NEN Trial that were not implemented. Why this is so needs to be considered. There are a number of possible explanations: their expectations were too high; they did not realise what other capabilities were needed to achieve the desired impact; the implementation of the NEN Trial was not designed to meet, or was inadequate to meet, their expectations.

The lowest areas of reported impact (*slight*), in both surveys, were related to *interaction and collaboration outside the school community*. These were also the areas where there was the largest difference between expected impact (2011) and reported impact (2012). This is concerning if one takes the view that a National Education Network should be enabling more interaction beyond the individual school. It would appear that the schools expected something more than did occur. The NEN Trial, through the Kiwi Advanced Research and Education Network (KAREN)[10] provided the capability for greater communication between schools and other members, but this does not appear to have occurred.

In addition to enabling changes to teaching and learning the Network for Learning is expected to allow for greater efficiencies for schools and to lower operational costs. However, the data from the NEN Trial suggest that, at least initially, this may not be the case:

Nearly half of the teachers (49%) and 61% of the principals reported that *teachers' professional workloads* had increased as a result of the NEN Trial. The results were not as pronounced for *administrative workloads* where 37% of teachers and 24% of principals reported an increase. Very few teachers or principals reported a decrease in either administrative or professional workloads with most of those not reporting an increase reporting no change.

Similar results were reported for the *financial impact* of the NEN Trial. Only 5% of principals reported the financial cost of operating their school had decreased. The rest were evenly divided between an increase and no change. Just over half of the principals (55%) reported that the cost of providing professional development to their staff had increased. Only 8% reported it had decreased.

1.3.4 Professional development and learning

The professional development opportunities provided through the regional support were reported, by the principals, as having the most impact on the participant schools, although it was only *moderate*. Further, those respondents (n=24) who completed questions related to NEN Trial professional development reported being *highly satisfied* overall with what they had received.

[10] KAREN (Kiwi Advanced Research and Education Network) is a data network providing high capacity, ultra high speed connections between New Zealand's universities, polytechnics, Crown research institutes, schools, libraries, museums and archives, and out to the rest of the world.

The data from the 2012 Principal Survey suggests that a range of professional development was offered across the trial. The low number of schools reporting no professional development in each of the areas suggests this was true across the three regional loops. Interestingly, there was no consistent reporting of professional development by loop in terms of those participating. It is likely that school size and location have an impact on the number of teachers able to participate.

Of note, is that less than half of the principals reported that all their teachers attended professional development related to the use of digital technologies in the classroom or to foster collaboration beyond the classroom. This means that in a number of schools the diffusion of any innovation or learning is dependent on internal collaboration and interaction networks. Of the teacher respondents, 73% reported they had received professional development related to the integration of digital technologies in their classrooms. This compares with only 35% reporting professional development related to collaboration outside the classroom and 22% reporting professional development related to their students using web 2.0 technologies. This is likely to be at least part of the explanation for the low levels of impact of the NEN Trial. The technical features of the NEN Trial are related to greater access to the world beyond the school. The professional development appears to be focused on use within the school.

One could argue a sequenced approach to professional learning – it begins in the classroom then moves to a more networked focus. The problem with this approach is that a networked approach is about a shift in paradigm and definitions of learning and school; not about skills in using technology. Showing teachers how to use technology within their classroom will not shift their paradigm or view of schooling. Most teachers are already successful users of technology in their professional practices – it is just not as apparent in student learning[11].

Also of note, is that the majority of the professional development these teachers report receiving has been informal. Further any workshops have tended to be led by colleagues from their school. Just over half of the teachers (56%) reported they had attended a session led by an external facilitator while 91% reported they had attended a session led by a member of their staff. While this can be seen as a positive, one needs to be cautious about the extent to which internal professional development fosters the necessary challenge and critique needed to change practice. If the internal professional learning is disseminating new knowledge, sharing and building on the learnings of others, then it can be powerful. However, too often such internal communities can reinforce and support current practice rather than supporting the creation and sharing of knowledge.[12]

1.3.5 Expertise and Confidence

Related to the provision of professional development is the extent to which teacher expertise and confidence is raised. In 2012 the teachers did not report particularly high levels of confidence and expertise. The area they were most confident in was their ability to learn how to use new technologies and applications ($\bar{x}$ = 4.76). The areas they were least confident in were related to the use of digital technologies to extend the learning experiences of students and to collaborate with others ($\bar{x}$ = 3.76; $\bar{x}$ =3.85 respectively). They were always less sure of their ability to facilitate student use than to use something themselves.

[11] This is evidenced in a wide body of literature, such as the research on the Laptops for Teachers programme. It is also evidenced in the findings in this evaluation.

[12] For more information on learning communities in a New Zealand context refer to the Network Learning Communities evaluation reports available at http://nzcurriculum.tki.org.nz/Curriculum-stories/Case-studies/NLC

Interestingly, given the reported impact of the professional development there were no marked increases in reported levels of confidence or expertise across the matched sample of teachers. The statements used in the survey were very specific; they related to using digital tools to support student learning. It may be that teachers are confident in their ability to use something (skills based professional development), know how tools can be integrated into teaching and learning (pedagogical professional development), but are not sure about how to actually do these things in their classrooms in ways that will promote learning.

Teachers were also asked about the confidence and expertise of their students. Anecdotally, a number of teachers have commented in the past that students are not as expert on computers as they expect them to be and that they need a lot of support to be able to use them. This is interesting and needs further consideration given the use of digital technologies by the young in their lives outside school.

The data reported here support the anecdotal evidence in that the teachers report that it is between *slightly* and *moderately* accurate that their students are able to effectively use digital technologies. The areas where they report the lowest mean levels are for *collaboration with others.* Given the extent to which young people use technology to communicate and interact outside school this seems surprising.

It may be that teachers are judging their students' abilities to use technology by their view of how they should be used. That is they are focussing on the process and method of use rather than the outcome of use. Outside school, most students are intuitive users of technology: they make the tool do want they want it to: they learn to do something when they need to and know how to get the outcome they want.[13] This may not sit easily with the more structured approach to learning in a school, or to the need of many teachers to control not only what is done but how it is done. Nor does it sit easily with notions of there being a "right" way of doing things.

1.3.6 Changes in the use of digital technologies in classrooms

The data presented in this report suggest the influence of the NEN Trial on participating schools has been minimal in terms of changes to teaching and learning. While there is a statistically significant increase in student use of technology across a range of outcomes, as reported in the student outcomes scale, the overall levels of use are low. Some possible reasons for this are discussed in the report.

Comparison between the 2011 and 2012 results show that for the other scales utilised there was a trend towards increases in use across all items but that this was not statistically significant for any of them. Further, the increase was small in all instances at both an item and component level.

In the eLearning scale (Principal survey) the *Collaboration* component mean remained the lowest and was statistically, significantly lower than that for either *Culture* or *Capability*. Across all the individual items in this scale the largest mean increase was only 0.37, and was related to the *involvement of teachers in professional development.*

Similarly, in the Teacher survey the mean level of use of digital technologies to *Create* artefacts remained higher than their use to *Collaborate*. The comparison between 2011 and 2012 for the

[13] Evidence for this can be found viewing any young person on public transport or in a cafe. It can also be found in literature such as that found on www.commonsense.org/research. An example is their report: *Social Media, Social Life: How teens view their digital lives.*published in 2012

matched sample showed an increase in the mean level of *Collaboration,* which approached statistical significance. The increase for the *Create* component was very small. The largest mean increase for any single item was still only 0.62 and was for the *creation of artefacts in a collaborative/interactive environment with other teachers*. None of the item increases were statistically significant. The implication is that teachers are starting to use technology in ways that extend the classroom context but only slightly.

The use of technology by students for particular outcomes, as evidenced in the student outcome scale, increased between 2011 and 2012 and in most instances this was statistically significant. This finding suggests that there has been an increase in student use of technology within the classrooms of the respondent teachers. This does seem to contradict earlier findings and it is worth considering this difference further in future research. Perhaps the nature of learning in classrooms is changing?

However, the levels of reported use in 2012 still did not reach the levels indicated by 2011 respondents as their preferred level of use. In both 2011 and 2012 the preferred level of use was statistically, significantly lower than the reported current level of use. This suggests teachers would like to see their students use technology more often but do not seem to be able to implement it.

This is interesting in that teachers are the major determiners of what occurs in their classroom. They largely decide the "how" of learning. Presumably, if they wanted their students to do more with digital technologies they could ensure this occurred? One explanation is that student access to technology remains a key barrier. The other explanation is that while in theory teachers say they want to do more this is not the case in practice. That is their espoused and actual theories of practice are quite different. It may be that their preferred levels are in fact what they see as "ideal" practice and not necessarily something that is possible.[14] While it could be argued that more time and/or greater responsiveness are needed it could also be argued that the integration of digital technologies into schools has been a policy and professional development focus for many years. It may be time to reconsider the nature of that professional learning and to genuinely reflect on the efficacy of what has occurred in the past.

1.4 Discussion

The NEN Trial evaluation was over a one-year period and as such one could argue there has been insufficient time for real change to occur. However, it needs to be remembered that many of these schools are part of well-established regional loops; they have been involved in ICTPD in the past and were presumably ready to embrace the technical capability provided by the NEN Trial.

The findings summarised above suggest that despite the access to ultra fast broadband and professional support little has changed in the schools, particularly with regard to collaboration and interaction beyond the school gates. In all sections of the report whether reporting impact, professional support or confidence, the lowest means were reported for the use of web 2.0 technologies and collaboration beyond the school. At an implementation level the NEN Trial appears

[14] For a discussion of this see: WARD, L., PARR, J.M. & ROBINSON, V.M.J. (2005). *Constructions of practice: Adding ICT to the swamp*. Paper presented at the Hawaiian International Conference for Education, Hawaii

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to have remained focussed on the classroom. It has not been implemented within a networked paradigm.

Further, teacher use and teacher needs were always emphasised over those of students. The implication is that our education system is still intrinsically teacher-centric. The focus has been on providing the tools to the teacher first – and only now are student needs coming to the fore. This is, perhaps, understandable but it does highlight another shift for schools to make along with that from paper-based to networked. Concurrently, they need to move from being teacher-centric to student-centric; from focussing on technology for teachers to ensuring students have the technology they need. They need to also think about the world beyond the school gate and what it can offer students.

Perhaps the key finding from this report is the need for those implementing and designing the Network for Learning to showcase the benefits of being networked, of utilising the Internet to extend the learning experiences of students beyond the classroom. The real potential of digital technologies to transform teaching and learning lies in their ability to enable us to reframe our notions of learning as something that occurs in a classroom, with a teacher, to a timetable. Currently they appear to be mainly used to supplement or enhance what is being done. In many instances, they do this well, but there is a question of value for money in terms of the investment in both infrastructure and professional development. Are there sufficient benefits to warrant the cost expended?

Creating a technical network is relatively easy; creating a network of learners, a learning environment that exists beyond the school is much more difficult. This requires a philosophical shift in the thinking of all those involved in education. It requires the shift to occur before the initiative is implemented – for people at all levels of education to be thinking in a networked paradigm, to be willing to look beyond the classroom, to take risks and to look for new solutions to old problems. Then digital technologies become part of the solution; they have a purpose and are used in ways that realise the benefits they offer.

Student access to the Internet and devices is currently problematic for most schools. It would appear that for schools wanting to maximise the potential of digital technologies and the networked world wireless and BYOD will have to be a primary focus. The findings in this report would suggest that many have already realised this. But schools need support to make the right decisions and they need help in ensuring the potential benefits are realised. The solution to this may reside in the need for schools and the government to be more explicit about whose responsibility it is to provide which aspects of the technology. If the Network for Learning can save money on content, services and access then that will free up school budgets for the necessary devices.

More problematic, arguably, is that digital technologies are largely being integrated into a 20th century notion of teaching and learning. When a school is digital it is essentially using technologies within a paper-based paradigm. They support what is happening in the classroom, they make administrative tasks easier for teachers, they make the access to information easier for both teachers and students; they enable multiple ways to present information and to synthesise what has been learned. But these uses do not transform the way students learn or what they learn. That requires a conscious decision by schools and teachers to do things differently.

Transformation of teaching and learning will not occur through the provision of technical and pedagogical capability alone. It is necessary to transform mindsets – to provide a new philosophy and paradigm within which people think. Schools and their communities need to be shown what is

possible, how to utilise what is beyond the school gate and how to ensure that translates into outcomes for students.

The questions this raises are:

How prepared are our schools and teachers to take risks? Will their communities and "the system" allow them to do so?

In this era of accountability how do schools merge the demands of National Standards and NCEA with innovation and transformation? Particularly if the "educational experts" do not themselves understand innovation in the digital world.

Is our education system really looking for transformation? Or does it want replacement and enhancement? Is the desired end-point the use of digital technologies in classrooms, within schools that are instantly recognisable?

If transformation of how our students learn is the desired outcome then schools need to be supported to shift their perspectives, to take risks and to share their learning: The potential benefits of doing so need to be made clear. Learning from the corporate and social worlds can help; looking beyond education for guidance. A national education network has the potential to be a powerful tool for enabling this shift.

Perhaps the words of one of the principals involved in the NEN Trial best sums up what is needed:

> *Three things irk me as they quickly become barriers to others engaging: How to avoid "technical train-spotting"; how to avoid people rushing off to the "next big thing"; how to avoid "brand name-blindness". The combination of all three of these should be a diagnosable medical condition that renders you unreliable in the advising or development of others.*
>
> *I am well aware that we are only part way into a Digital Revolution that is likely to change society, including lifestyle, work, and learning more so than any of the similar 'revolutions' from the past (e.g. Industrial Revolution). Knowing that we don't know how this will end nor how it will get there is also OK. We just need to factor continuous change and 'un-learning' into our thinking and approach. I believe it is important that we equip our Teachers and Students, and those advising/training them with a wider view. So we can scaffold their learning experience to one of continuous change and development - and that's OK.*
>
> *For example, "We know people learn and work better in groups. Especially when they feel confident and safe enough to share their ideas and questions. This 'software/tool/device' is one way we can currently support our learners to do this. There will be a newer version or an even better way soon enough. But in the meantime here's how we can do this, ...and how others have used it, ...and the effects that it has had..."*
>
> *Most importantly we need to give our people the confidence to fail. To give something a go; have it crash on them; recover the moment and the learning; reflect on it a bit; and then at an appropriate time give it another go.*
>
> *The full potential of the NEN Trial won't be realised until we learn that this is about equipping people with perspectives, as well as skills, and the confidence to fail. And through this nurture the flair to play in the future.*

2.0 INTRODUCTION

2.1 Reading this report

The structure of this report is thematic. Responses from both principals and teacher surveys are included in the same sections. Also included in the same sections are findings pertaining to 2012 as a point in time and, where relevant, findings related to shifts over time for the matched samples of both principals and teachers.

Also to note is that large data tables such as demographics and the results of statistical analyses are in the appendices. These are referred to in the text. Other data, more directly relevant to the findings, are reported in the body of the text for easy reference.

2.2 Conceptual framework

This report and the tools used to gather the data have been developed within a conceptual framework related to the extent in which are schools are operating within a networked paradigm, similar to the corporate/business and social worlds outside their gates. As discussed in the prologue this framework does not seek to undermine the progress schools have already made, but looks to the future in an attempt to highlight the journey many still face.

This paradigm is seen as a further stage in the evolution of schooling from the 20th century industrial model of education. Under the 20th century model as many students as possible are taught a core curriculum of information, delivered by a teacher. Schools are essentially structured around silos of classrooms, content areas and timetables. The teaching is bounded by time and space, and also by the accepted curriculum. The core technology for this paradigm is essentially paper.

In the 21st century a networked model would see the use of web 2.0 and other technologies breaking down these silos and teaching and learning being extended beyond the school gates, involving a range of people, taking place in multiple contexts (both real and virtual) and occurring across time. It would also see greater transfer and development of knowledge between individuals and across curricula. Such a model allows for greater individualised learning for students. To implement this model technology needs to be in the hands of students and normalised in all areas of the school's operations.

Between these two paradigms is the digital phase. Many schools have normalized the use of the digital into their practices. Indeed, for most teachers digital technologies are an essential tool in their professional work. ICTPD, the provision of laptops for teachers (TELA), SNUP, and other initiatives have helped this normalization to occur. However, the normalization of the digital does not necessarily mean a transformation of the teaching and learning is occurring. The use of digital tools appears to remain largely within the industrial model of education; they have replaced paper. Learning is still controlled by the teacher; it is still often siloed in both context and content. Digital tools are used to bring the outside into the school – not to facilitate a two-way interaction in and out. This digital phase can be described as the supplementing or replacement of pen and paper with digital tools. It is not transformation per se.

To be networked schools need to have the necessary capability (technical and human expertise) and culture (willingness and desire to do things differently). Normalising the use of the digital is a

necessary precursor to operating in a networked paradigm. It should be seen as a capability not an end point. Further, understanding how to use digital tools in a pedagogical framework is only transformational if that pedagogy is transformational.

In this report, the extent to which schools are networked is measured. It is readily acknowledged that few schools operate in this paradigm but it is important that the possible journey ahead for schools is signposted. For the Network **for** Learning to impact on teaching and learning it will need to support the development of a Network **of** Learners – to allow the use of technology in ways that will shift the current model of teaching and learning.

One vision of success for a national education network is that schools, teachers and their students, are able and willing to operate in the networked paradigm. This is more than enabling them to bring the external world into their classroom; it is also about taking the classroom out into the world. It is this vision, which underpins this report.

2.3 The NEN Trial

Through the NEN Trial extension the schools were given access to the KAREN Network technical support from REANNZ[15] and professional development funding through the ICTPD (Information and Communication Technologies Professional Development) fund. To receive the professional development funding clusters had to provide detailed work plans and report to the Curriculum, Teaching and Learning team in the Ministry of Education as part of regular monitoring and milestones. As a result of the NEN Trial one could argue these schools were in a very strong position to realise the benefits of ultra-fast broadband in schools.

Although no in-depth monitoring or review of the professional development provided was undertaken, the evaluation team did look at the initial work plans from the regional professional development providers. At that stage there was concern that the focus appeared to be on teacher use within the classroom and had not seemed to move beyond this. Further, there was a very strong regional focus with little apparent intention of utilizing the potential of a National Education Network; that is a network comprised of the four loops in different geographical locations, now connected by a fibre backbone enabling speed of communication

This limited the potential of the NEN Trial as a test bed for the Network for Learning in that it did not allow consideration of collaboration beyond a school's immediate geographic location. The extent to which the Network for Learning will be able to provide for wider collaboration cannot be determined by these data, but they do highlight the need for a concerted effort to encourage schools to look beyond their immediate environs. It may be that if their professional development is sourced locally the same issue will arise whether schools are part of a loop or not.

2.4 NEN Trial extension objectives

The objectives of the NEN Trial were to:

Test proof scale of connectivity of ultra-fast broadband for up to 102 schools.
Understand the policy, technical and commercial issues in extending the NEN Trial to more schools.
Understand the key issues for connection of a range of services.

[15] REANNZ (Research and Education Advanced Network, New Zealand) provides a range of network and supporting services to New Zealand's research, education and innovation communities. More information is available at www.reannz.co.nz

Understand the potential transformational impact on learning and teaching practices, student outcomes and schools' administrative practices.
In this impact report the focus is on the latter objective only. Changes in teacher practices and student learning experiences are described. Also described are the attitudes and values of respondents with regard to digital technologies and their perceptions of the impact of the NEN Trial. A section on the efficacy of the professional development provided through the NEN Trial, as reported by the respondents to the 2012 survey, has also been included

The nature and extent of the professional development provided is likely to be an important determinant of the success of the NEN Trial with regard to teaching and learning. This was not evaluated elsewhere due to budget and time constraints. However, any long-term study of the Network for Learning must include an understanding of the nature of professional development/learning the school leaders, teachers and others in the school community are participating in, including formal professional development or more informal professional learning opportunities.

Data directly related to student outcomes was not collected due to constraints of time and budget. Student non-academic data was collected in Ashburton schools as part of a case-study approach undertaken in 2011, but this was only for ten classrooms. These data have been reported in two other reports[16] [17].

In the future, there would be considerable benefit in comparing student outcomes over time in any school where there is a technological innovation such as the NEN Trial. However, for this to be valid one would have to also collect data related to the level of implementation of the innovation. That is, evidence of the extent to which teachers utilise the technology and how they do so. Without this evidence one cannot determine whether there has been any correlation, let alone causality, between the innovation and student outcomes.

2.5 The NEN Trial schools

The NEN Trial involved 102 schools from around New Zealand. These schools were clustered into four groups. Two of these were based on existing regional loops in Christchurch (n=31) and Nelson/Marlborough (n=34). A third group were a new regional cluster in Ashburton (n=24). The original group were the Proof of Concept schools (n=23). The Proof of Concept schools joined the NEN Trial in 2008. The trial was extended to include the other schools in 2011.

Table 17 (Appendix One) provides details of the demographics of all schools participating in the NEN Trial by group. Note that the percentages in each column are based on the total number of schools within each group. Of particular note, regarding the representativeness of the NEN Trial sample with schools nationally, are:[18]:

The very low representation of low decile schools (n=7, 7%). This compares with 31% (n=781) of the national population of schools (n=2548)

[16] Ward, L. & Marentette, P. (2011). *Outcomes beyond academic: Student motivation, engagement and cognition*. NEN Trial Evaluation Report Series No. 3. Wellington: Ministry of Education
[17] Ward, L. (2012). *Outcomes beyond academic: Student motivation, engagement and cognition revisited*. NEN Trial Evaluation Report Series No. 7. Wellington: Ministry of Education
[18] Comparisons with national figures are based on the 2011 school returns information on Education Counts.

The proportion of primary (n=50, 49%) and secondary (n=35, 34%) schools. Nationally there are around 2007 primary schools, which is 79% of schools (n=2548). This means that compared with national figures there is an over representation of secondary schools.

The representation of main urban schools (n=62, 62%) is slightly higher than in the national population, which has 54% of schools in main urban areas. The other areas also vary from the national population: secondary Urban is 6% nationally compared with 12% in the NEN Trial sample; Minor Urban is 11% nationally compared with 8% in the NEN trial sample; Rural is 28% nationally compared with 19% in the NEN trial. As a result the NEN Trial sample is more likely to be in a larger urban area than the national population of schools.

While a comparison was not made regarding school sizes the school type comparison above suggests the NEN Trial sample is not likely to be nationally representative by this demographic.

The schools were all on fibre and, in most cases; their school networks had been upgraded, if necessary, through SNUP (School Network Upgrade Programme). The need for access to fibre in order to join the NEN Trial will have had an impact on the demographics of the schools.

2.6 Students in the NEN Trial schools

In considering representativeness it is also important to consider the ethnicity of the student population within the NEN Trial schools. This is particularly relevant given the priority placed on raising the achievement of Māori and Pasifika students and students from low socio-economic areas by the Ministry of Education. The latter has already been noted as a concern in terms of representativeness regarding low decile schools.

A comparison of national student ethnicity figures and the student population in the NEN Trial schools shows that the sample schools are not representative in terms of student ethnicity, with the exception of Asian students.

Across the NEN Trial schools 73% of the student population is European/Pakeha compared with 55% nationally.

While national figures show that 23% of students are Māori, only 15% of students in our sample schools are.

Similarly, the national figure for Pasifika is 10% compared with 4% for the sample.

Finally, there are very few schools catering specifically for children with special education needs in the sample, another priority group. It is not known how many children with special education needs are enrolled in the NEN Trial extension schools.

3.0 METHODOLOGY

The data reported here were gathered from surveys administered in July 2011 (baseline surveys) and again in July 2012. At both points in time, a principal and a teacher survey were used. In July 2011, an infrastructure survey was also administered, but this was not repeated in July 2012[19]. Data were also gathered through discussions with key regional support providers regarding the impact of the NEN Trial. Other information collected throughout the period of the evaluation has also been referred to where relevant.

The surveys were administered electronically using Survey Monkey. In both instances principals were sent emails including information about the surveys and the relevant links. They were asked to forward the surveys to their teaching staff. Numerous reminders were sent out to schools over the period of time the surveys were open. Regional support providers were also asked to remind their schools and support the evaluation. The poor response rates reflect the influence of a range of factors on the willingness of schools to participate in evaluations such as these. Amongst these is the high level of demand often placed on them for evaluation, the lack of any direct benefit for them in participating and their relationship with the Ministry at any given time.

3.1 Evaluation purpose

The primary purpose of the NEN Trial Evaluation was to determine the effect of participation in the NEN Trial on school and classroom practices overtime. However, the NEN Trial also served as a test-bed for the design and implementation of the Network for Learning. As such, a range of other research activities were also undertaken over an 18-month period. These included classroom observations, student non-academic outcomes, teacher and student interviews and discussions with regional providers. Information gathered through these activities has been reported elsewhere and provided for the planning of the Network for Learning.

3.2 Participation in the surveys

Despite the agreement of the schools to participate in the evaluation, the response rates were disappointing and meant a small sample for comparing data across the two points in time.

Table 1 presents the numbers of principals and teachers completing the various surveys. The teacher participation figures also include the number of schools represented. No percentage is shown for the number of teachers participating in the survey as the figures for the total number of teachers across the 102 NEN Trial schools are not readily available. However, the figure would be very low. If each participating school, for example, had an average of 20 teachers, there should have been 1040 teachers. The return rate then would be 24%. If this is extrapolated to all NEN Trial schools the return rate would be around 12%. The number of large and very large schools suggests even this is high.

[19] This was due to the implementation of the Schools Technical Infrastructure Survey.

Table 1: Participation rates for surveys

Survey	2011		2012		Both	
	n	%	n	%	n	%
Principal's survey	62	61	45	44	26	25
Teacher's survey – teachers[20]	251	24	209	20	53	5
Teacher's survey - schools	53	52%	26	25	16	16

The numbers presented above are the maximum number of respondents to the questions in each survey. However, there were missing data for a number of items. As a result the number of actual respondents to each question is reported in the survey and any percentages reported are based on the actual respondents not the overall sample.

3.3 Respondent school demographics

Table 18 (Appendix One) presents the demographics of respondents' schools for the 2012 surveys and for those who completed both surveys. As the table shows, a similar range to the overall NEN Trial demographics is represented. There are schools from all demographic categories such as size and location. Further, each of the loops is represented to some extent. The predominance of respondents from Ashburton schools should be noted; particularly as this is a greenfields loop. As such there was, perhaps, more likelihood of shifts in practice amongst the Ashburton schools than others. Further, were they too follow the same developmental patterns as the other, more established loops, it is very likely they would focus on the first level changes related to creation and classroom practice. This could help explain the findings in the report with regard to greater shifts in these areas, raising a concern as to how this inward looking focus can be changed.

3.4 Principal respondents

The demographics of the principal respondents are displayed in Table 20 (Appendix One). Key points include:

For both samples (2012 only and 2011/2012 matched), the proportion of females (n=19, 42%; n=14, 44%) is lower than males (n=26, 58%, n=18, 56%) are similar. Nationally, males represent 51% of all principals, so they are slightly over-represented in these samples.

The largest group of principal respondents, in terms of age, are those in the 51 to 60 age group. This group account for 44% of the NEN Trial principal respondents for the 2012 sample and for 53% for the 2011/2012 matched sample. These figures compare with 46% nationally.

Our NEN Trial sample of principal respondents is over represented in the under 40 age group, with 18% of respondents in this group in the 2012 sample and 19% in the matched sample compared with 8% nationally.

3.5 Teacher respondents

The demographics of the teachers who completed the 2012 survey and those who completed both surveys are shown in Table 19 (Appendix One).

The NEN Trial sample has a higher proportion of males than is the case nationally with 35% in the 2012 sample and 28% in the broadly matched sample compared with 25% nationally.

[20] Note this percentage is based on the estimated figure of 1040 teachers as discussed and as such is a very broad estimate only.

In terms of age group our 2012 sample population is very similar to the national population.
For the Principal Survey, it was possible to directly match those respondents who had completed both surveys. For the teacher Survey this was more difficult due to a lack of teacher names. A broadly matched set of teachers has been developed where schools and core demographics are the same for both sets of data. It is not possible to argue with surety that these are the identically matched pairs of teachers. There is, however, confidence that they are very similar. The statistical tests used to determine shifts over time took into account that these were broadly matched rather than identical samples.

3.6 Survey content

The questions for the surveys were developed in consultation with eLearning personnel from within the Ministry as well as external stakeholders (regional loop management representatives and external PD providers). They were developed within a networked paradigm of schooling, as discussed in the conceptual framework section. Whilst it seemed likely that very few, if any, of the schools would be operating within this paradigm it was felt important to measure against the desired end point, particularly given the pilot nature of this study in the context of the Network for Learning..

Given the pilot nature of these surveys there are differences between those developed in 2011 and those used in 2012. In Appendix two, Table 21 (Teacher Survey) and Table 22 (Principal Survey) summarise the content of the surveys by reporting the number of questions focussed on specific areas of interest for each time point.

The key scales related to the use of digital technologies across schools and in classrooms were retained to enable a measurement of shifts over time. These had proven successful in the first iteration and, with one exception, the items did not need to be changed. The exception was the removal of three items from the *Student Outcomes* scale in the Teacher Survey for 2012. The items related to specific Ministry of Education outcomes were removed and a more specific question around the use of digital technologies in the New Zealand policy context was added.

A number of questions have been included in 2012 that refer to general attitudes and values towards the use of digital technologies. Understanding how teachers feel about digital technologies and where they are most useful could help explain their current practice and what, if anything is needed to change that practice. Also included in 2012 were a number of items specifically related to the impact of the NEN Trial and the professional development that had been received over the period from July 2011 to July 2012.

This time period is slightly problematic in that it does not match the school year. Even where teachers do not change schools they are not always teaching the same year level. However, the timing of the NEN Trial evaluation, and the original expectations around the launch of the N4L meant that data gathering could not be built around the school year.

Those principals and teachers who had taught at a different school in 2011 were asked to compare their two schools across a range of areas. This was an opportunity to compare NEN Trial schools with those not in the trial. However, there were very few responses to this section as most of the respondents appear to have remained at their 2011 school. As a result, they have not been reported here.

3.7 Limitations

The sample sizes are large enough to consider individual principals and teachers as the case for analysis. That is conclusions can be drawn about individual principal (school) and teacher practices. Further, the sample is broadly representative of the national sample in terms of age and gender.

However, beyond this there are limitations:

1. The sample sizes, while relatively large for New Zealand research, are problematic for statistical modelling in that cell sizes can still be too small when grouping respondents.
2. Ideally, it would be possible to compare principal data against that of teachers being sure that our sample contained identical schools. This is not possible here because of the wide variation in numbers of teachers from individual schools and because there are only ten schools for which both principal and teacher responses are held for 2012. Further, there are only three schools for which both principal and teacher responses are held for the matched sample sets.
3. It was not possible to identically match the 2011 teacher sample with that of 2012. The sample is only a broadly matched.
4. Because the time period covers two school years there are likely to have been changes to the students in teachers' classes if not the year groups or subject they are teaching. Teaching is often highly contextualized and this does need to be taken into account when looking for shifts in practice.

4.0 Respondent Attitudes and Values

In 2012 both the Principal Survey and the Teacher Survey included questions about respondents' attitudes and values regarding digital technologies. Their responses to these questions are reported here. Understanding teacher values is important; a wide range of research has shown that teacher values and attitudes are a key determinant of their practice.

Given that this section does not measure changes over time all respondents who completed the surveys have been included in the sample.

4.1 The importance of digital technologies

Respondents to both surveys were asked how important was each of five items. A six point response scale (1=not at all, 2 = very slightly, 3 = slightly, 4 = moderately, 5 = highly, 6 = very highly) was used. Table 2 summarises the responses from both surveys.

Key points are:

Overall the respondents to both surveys consider digital technologies to be important across all areas.

The overall mean responses from the teacher respondents range from 4.56 to 5.51. For the principals the range is 4.93 to 5.67. Both are relatively small ranges (0.95 and 0.74 respectively).

It does appear that the principal respondents consider digital technologies to be more important than the teachers (this was true for all items).

The high standard deviations highlight the variation in individual responses. In the teachers' case this is particularly true for student access.

Also worth noting is the higher importance placed on teacher access and use within classrooms. This is potentially of concern given the literature suggesting devices need to be in the students' hands rather than their teachers if the educational benefits of technology are to be realised.

Table 2: Mean levels of reported importance by teachers and principals

	Teacher (n=200)		Principal (n=45)	
	$\bar{x}$	SD	$\bar{x}$	SD
Teachers have access to the digital tools they need to do their work	5.51	0.693	5.67	0.516
Digital technologies are used in classroom practices by staff and students	4.99	0.781	5.38	0.643
Digital technologies are used for collaboration/interaction with others beyond the school gate by staff and students	4.75	0.963	5.24	0.821
All students have access to digital devices at all times during school	4.63	1.113	4.93	0.879
All students are able to access the Internet at all times during school	4.56	1.152	5.31	0.694

4.2 Using digital technologies to achieve outcomes

Respondents to both surveys were asked to indicate the extent to which they believe the use of digital technologies supports a range of outcomes. The same six point response scale was used as above.

Table 3 summarises the responses to this question. The key points are:

Across all items, teachers reported a mean level of support between *moderately* and *highly*. The range was 3.96 to 4.85. Only two items were above 4.50, which would equate to *highly*.

The principals reported slightly higher means ranging from 4.04 to 5.20. The pattern of responses was similar to those of the teacher respondents.

The standard deviations were high for all items across both principals and teachers reflecting the variation between individual responses for each item. This could be a reflection of sector differences in the case of student outcomes, which have higher standard deviations than other items.

Interestingly, the lowest levels of reported support were for the item related to *social and emotional outcomes* (teachers $\bar{x}$ =3.96; principals $\bar{x}$ =4.04), which would include self-responsibility, self-efficacy and other outcomes often attributed to the use of digital technologies. This is compared with the highest level of support for *increasing student engagement and motivation* (teachers $\bar{x}$ = 4.85; principals $\bar{x}$ =5.20).

Also of note is the higher level of reported support for *raising the achievement of students with special education need*s (teachers $\bar{x}$ =4.70; principals $\bar{x}$ =4.89) compared with that of *Māori* and *Pasifika* students (teachers $\bar{x}$ = 4.16; principals $\bar{x}$ =4.56 for both).

It is interesting that the means for Māori and Pasifika are identical. A comparison of individual responses shows that generally respondents gave these two areas the same score. A possible implication is that teachers and principals view these two groups as requiring the same teaching and learning practices.

Table 3: Mean levels of reported support from the use of digital technologies

	Teacher (n=200)		Principal (n=45)	
	$\bar{x}$	SD	$\bar{x}$	SD
Increasing student motivation and engagement in the classroom	4.85	0.910	5.20	0.833
Raising the achievement of students with special education needs	4.70	0.903	4.89	0.767
Providing a means for engaging with family and whānau	4.41	1.110	4.53	0.957
Raising the achievement of students from low socio-economic backgrounds	4.36	1.034	4.67	0.789
Improving academic achievement as measured by National Standards and/or NCEA	4.24	1.084	4.62	1.060
Raising Māori student achievement	4.16	1.049	4.56	0.831
Raising Pasifika student achievement	4.16	1.033	4.56	0.831
Improving social and emotional achievement outcomes for students (e.g. related to key competencies and values)	3.96	1.167	4.04	1.192

4.3 Digital technologies as a priority

Both the principals and the teachers were asked the extent to which they personally believe that digital technologies should be a priority for schools when compared with other competing priorities for funding, time and resources. A six-point response scale was again used ranging from *not at all* through to a *very high* priority.

The mean level of reported priority for the teacher respondents was 4.85 (sd = 0.910). This suggests that for these teachers digital technologies are a *high priority*. The principals reported a very similar mean of 4.89 (sd =0.614). These means are higher than those reported for individual areas in the previous questions. The implication is that the importance of digital technologies is cumulative across a range of outcomes and uses.

The teachers were also asked the extent to which they believe their school leadership values the use of digital technologies in teaching and learning. The mean level of reported value was 4.41 (sd=1.110). This equates to *moderately* on the six-point scale used.

5.0 ICT INFRASTRUCTURE

Respondents to both surveys were asked questions related to the infrastructure in their schools. Findings related to these are discussed in this section.

5.1 Satisfaction with the current infrastructure in 2012 (Teachers)

The respondents to the teachers' survey were asked about their levels of satisfaction with identified features of their school's ICT infrastructure and professional development. A six-point response scale was used: 1=not at all, 2=very slightly, 3= slightly, 4= moderately, 5=very, 6=extremely.

Table 4 summarises the findings from the 2012 survey across all respondents (n=184).

Table 4: Levels of satisfaction with current infrastructure

	$\bar{x}$	SD
Access to a range of digital technologies to support teaching and learning	4.24	1.234
The technical support provided to ensure the digital technologies work effectively	4.12	1.405
Access to a range of relevant content and services on the Internet to support learning	4.11	1.142
The speed of the network	3.95	1.438
Ability of students to access and use different sites and resources using the Internet	3.95	1.308
The reliability of the network	3.92	1.397
Opportunities to develop your capability in using digital technologies in the classroom	3.87	1.337
Ease of access to the Internet around the school for students	3.73	1.537
Ease of access to computers around the school for students	3.15	1.385
The number of computers available for student use	3.03	1.377

Key points include:

As the table shows these teachers are only *slightly* to *moderately* satisfied with the infrastructure in their schools in 2012.

The three items with the lowest reported levels of satisfaction relate to student access. They are least satisfied with the *number of computers for students* ($\bar{x}$ = 3.03) and the ease of *access for students to computers* ($\bar{x}$ = 3.15). They are only *slightly* satisfied with *access to the Internet for students* ($\bar{x}$ =3.73*)*.

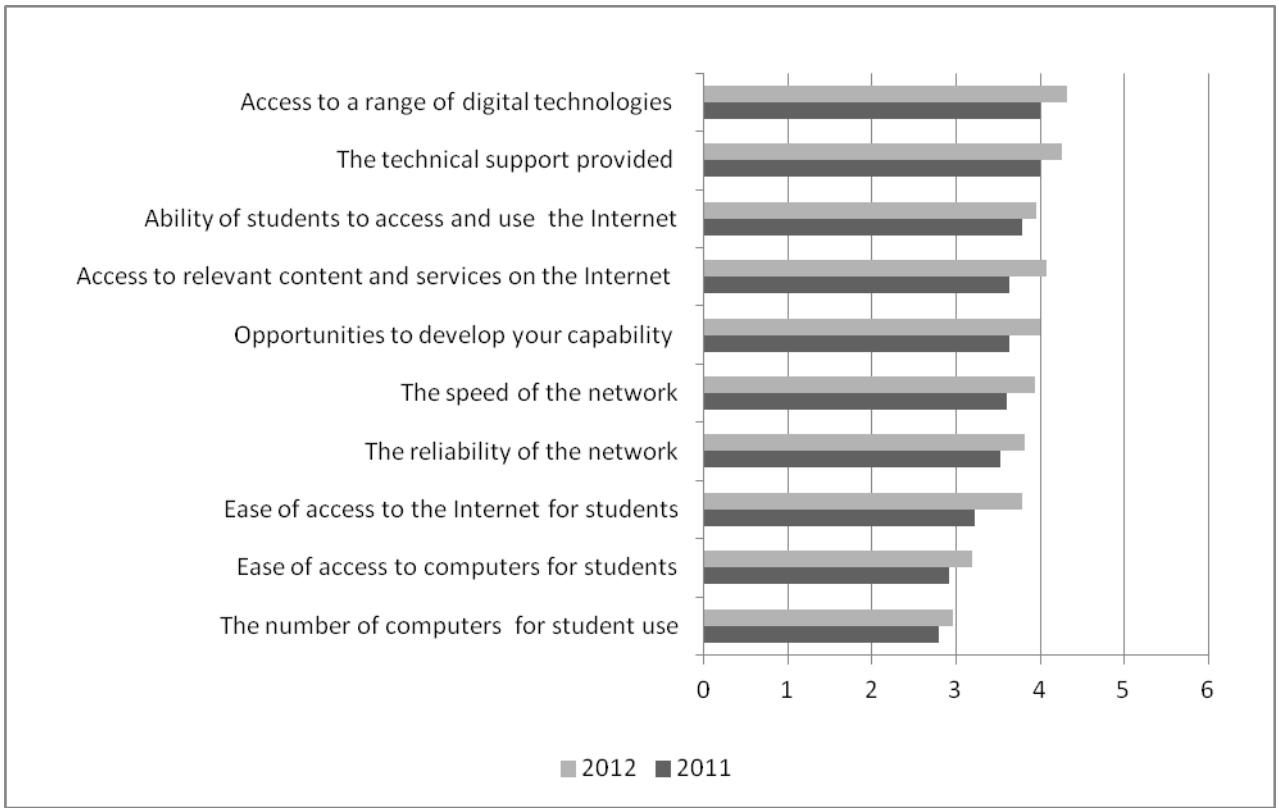
They are most satisfied with the range of digital technologies to support teaching and learning. ($\bar{x}$ = 4.24).

As with all questions the standard deviations are very high. This could be due to variation between schools (although the sample teachers are only drawn from 17 schools). It could also be due to different expectations. Satisfaction is subjective, it depends on what teachers want to do and how well the infrastructure meets their individual needs and what they perceive to be those of their students. Of note here, though, is that these teachers overall are not very satisfied with the infrastructure in their schools.

5.2 Changes in satisfaction over time

Figure 1 compares the levels of satisfaction for the broadly matched teacher respondent group between 2011 and 2012. It shows that, although relatively stable, there was a trend towards an increase in satisfaction across all identified areas. Statistical testing showed this was significant for one area only. This was the *ability of students to access the Internet*[21]. Given comments from principal respondents regarding upgrades to their wireless systems in many schools this is probably not surprising (reported in the impact section).

Figure 1: Comparison of levels of satisfaction



[21] F(1,101)=4.164, p<0.05

5.3 Use of digital technologies at home

Respondents to the teacher survey were asked, on average, how much of the professional work they do on a computer is done at home, outside of school hours. This was to consider the extent to which the school infrastructure could influence their overall use and the impact of their home infrastructure on that use. The laptop study undertaken by Parr and Ward (2010)[22] showed that many teachers preferred to work at home rather than stay at school later in the afternoon. The portability and flexibility afforded by the laptops was one of the key benefits for the respondents in this study.

As Table 5 shows, there is a wide range of practices reported by the respondent teachers (n=208). Slightly less than half of the respondents (49%, n= 102) report that more than 51% of their professional work is done on a computer at home. This should be considered when looking at the usage of school infrastructures, and teacher needs moving forward.

Table 5: Percentage of professional work done on a computer at home

	n	%
Less than 10%	14	7
10% to 30%	49	24
31% to 50%	43	21
51% to 70%	44	21
71% to 90%	37	18
More than 90%	21	10

The principals were asked whether their staff had remote access to the school server. Thirty principals (67%) indicated they did have. Such access could well make it easier for teachers to work at home and potentially increase the amount of professional work undertaken on computers at home. Combined with the portability of laptops they are essentially granted the same freedom to work from anywhere that many in the corporate world already have.

[22] Parr, J.M., & Ward, L. (2010). Laptops for Teachers Evaluation. Report to the Ministry of Education, Wellington, New Zealand. UniServices, University of Auckland.

6.0 THE IMPACT OF THE NEN TRIAL

Both the Teacher Survey and the Principal Survey contained questions related to the impact of the NEN Trial. These are reported in this section.

6.1 Reported levels of impact

Both the teachers and the principals were asked to report on the levels of impact of the NEN Trial over the preceding 12 months. A six-point response scale was used: 1= no impact, 2= very slight impact, 3 = slight impact, 4= moderate impact, 5=strong impact, 6 = very strong impact.

6.1.1 Teacher reported impact

Table 6 presents the findings from the 2012 teacher responses (n=138). None of the identified areas for possible impact has a mean level of 4 or higher (*moderate impact*). This suggests that the NEN Trial has not had a marked impact on these respondents over the preceding 12 months. Of note is that:

The lowest levels of reported impact are in areas related to *interaction and collaboration outside the school community* (means range from 2.59 to 3.08). This suggests that simply making it possible to interact and collaborate more will not mean a change in practice.

The highest mean levels of reported impact are for the *reliability and speed of the Internet* ($\bar{x}$ = 3.87) and *access to educational resources* ($\bar{x}$ =3.99). Arguably one could have expected both of these to be higher, given the assumed benefits of KAREN membership.

The reported impact on *student outcomes,* both non-academic ($\bar{x}$ = 3.15) and academic ($\bar{x}$ =3.19), is also low. This is probably not surprising given the low reported levels of impact elsewhere.

Table 6: Teacher respondents' reported levels of impact in 2012

	$\bar{x}$	SD
Your ability to access educational resources relevant to meeting the needs of your students	3.99	1.558
The reliability and speed of your school's internet	3.87	1.622
Your workload with regard to administrative tasks such as reporting to parents, recording student achievement, taking the roll	3.72	1.542
Your workload with regard to professional activities such as preparing lesson plans, developing resources	3.71	1.491
The range of media through which your students can access information and knowledge to support their learning	3.70	1.463
Your students' expertise in using digital technologies	3.60	1.427
The way your students experience and participate in learning	3.57	1.489
The engagement of your students in the teaching and learning activities in your class	3.52	1.490
Opportunities for you to undertake professional learning/development	3.50	1.450
The academic achievement of your students	3.19	1.397
Social outcomes for your students related to the key competencies, including participating and contributing, managing self and relating to others	3.15	1.357
Opportunities for you to collaborate with staff and students from other schools	3.08	1.485
The involvement of the wider community in school-wide activities	2.85	1.414
Opportunities for your students to access external experts who can support them with their learning	2.77	1.461
The involvement of parents and whānau in the learning of their children	2.71	1.370
Opportunities for your students to collaborate with students from other school in learning activities	2.59	1.407

6.1.2 Principal reported impact

Table 7 displays the principal responses to the question regarding impact over the previous 12 months. As with the teacher responses the levels of reported impact were all between *slight* and *moderate*, ranging from 2.97 through to 4.34. Of note are:

As for the teacher responses the lowest levels of reported impact were related to *collaboration with those outside the school*, particularly for students.

The highest reported impact was for the *professional learning opportunities* provided for teachers ($\bar{x}$ = 4.34) and the effectiveness of the *school ICT infrastructure* ($\bar{x}$ = 4.32).

What these data show is that the lowest impact is reported for those areas requiring notions of schooling, of teaching and learning, outside the traditional siloed and paper-based paradigm. The highest areas are for fundamental tasks and infrastructure, things required regardless of the paradigm schools and teachers are operating within.

Table 7: Principal respondents' reported level of impact in 2012

	$\bar{x}$	SD
Professional learning opportunities for teachers	4.34	1.262
Effectiveness of the school ICT infrastructure	4.32	1.396
Teaching and learning practices in the classroom	4.16	1.089
Student skills in using digital technologies (digital literacy)	3.97	1.347
Student engagement in classroom activities	3.97	1.460
Financial cost of providing for digital technologies/eLearning in the school	3.89	1.468
Student academic achievement	3.68	1.172
The workload of teachers with regard to professional activities such as preparing lesson plans, developing resources	3.68	1.416
Efficiencies in completing administrative tasks within the school (accounting, roll returns etc)	3.68	1.489
Financial cost of operating the school	3.62	1.495
The workload of teachers with regard to administrative tasks such as reporting to parents, recording student achievement, taking the roll	3.43	1.366
The opportunity for staff to collaborate/interact with staff and students from other schools	3.43	1.306
Social outcomes for students related to the key competencies (self-management, participation and contributions etc.)	3.39	1.309
The involvement of parents and whānau in the learning of their children	3.16	1.387
The involvement of the wider community in school-wide activities	3.11	1.410
The opportunity for students to collaborate with students from other schools in learning activities	2.97	1.224

Of concern is the potential recursive cycle that is shown in these data. Low impact in key areas such as student outcomes is likely to lead to lower levels of motivation for teachers to do more with technology. Changing practice, even if it is only superficially by using a different medium of delivery, is time consuming and sometimes risky. Teachers need to be sure that there will be benefits to doing so – and these benefits need to be things they value. The problem is that without more use in certain areas there will not be more impact. Without more impact it is difficult to show sufficient benefits to encourage use.

6.2 Expected versus reported impact

In 2011 the survey questions asked respondents about their expectations regarding the impact of the NEN Trial. The same items were used in 2012 to determine the extent to which their expectations had been met. In this section a comparison is made between the expected (2011) and reported (2012) levels of impact using the matched data sets for both the principal and teacher respondents.

Figure 2 (teachers) and Figure 3 (principals) directly compare expected and reported levels of impact.

For both groups the expected levels of impact reported in 2011 were not achieved for any area in 2012.

For the teacher data, the differences between expected and reported impact were statistically significant with two exceptions: administrative and professional workloads (Table 24, Appendix Seven).

For the principals there were eight areas where the differences were statistically significant (Table 25, Appendix Seven). These were social outcomes for students, student skills in using ICT, student engagement in classroom activities, the involvement of parents and whānau, the involvement of the wider community, the opportunity for staff to collaborate/interact, the opportunity for students to collaborate and the effectiveness of the school ICT infrastructure.

Figure 2: Comparison between expected and reported impact (teachers)

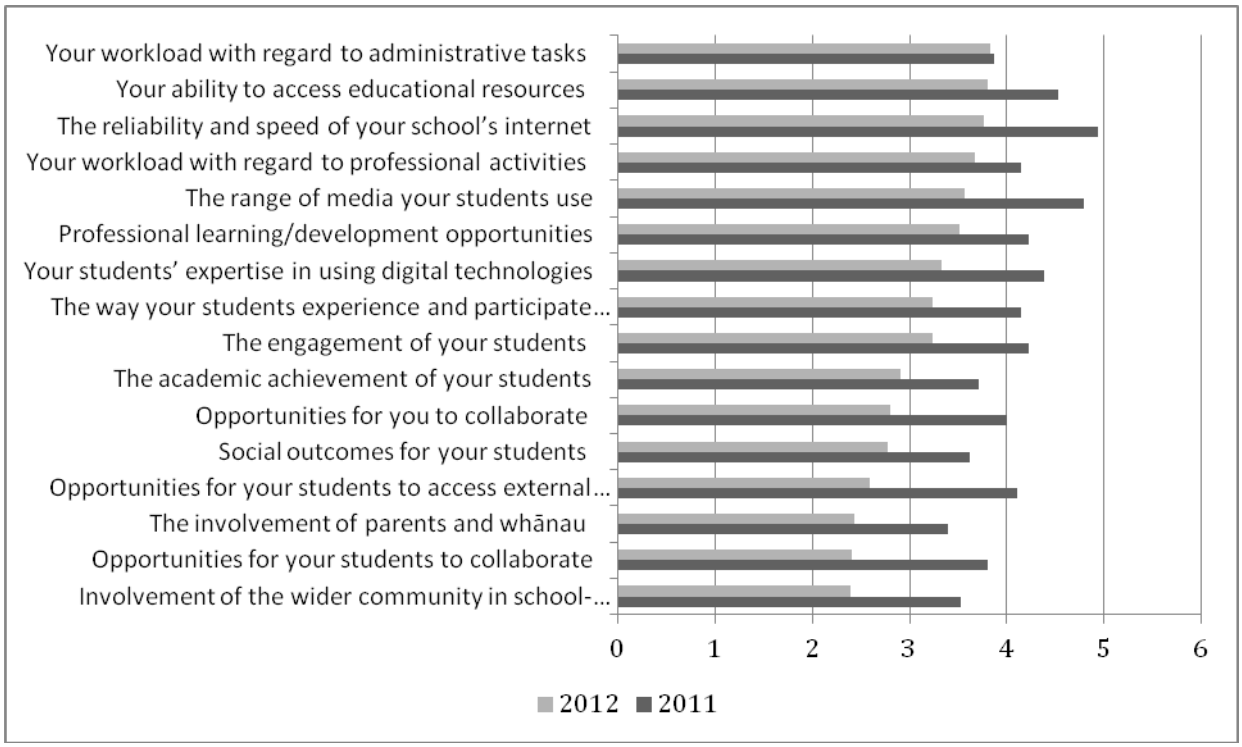
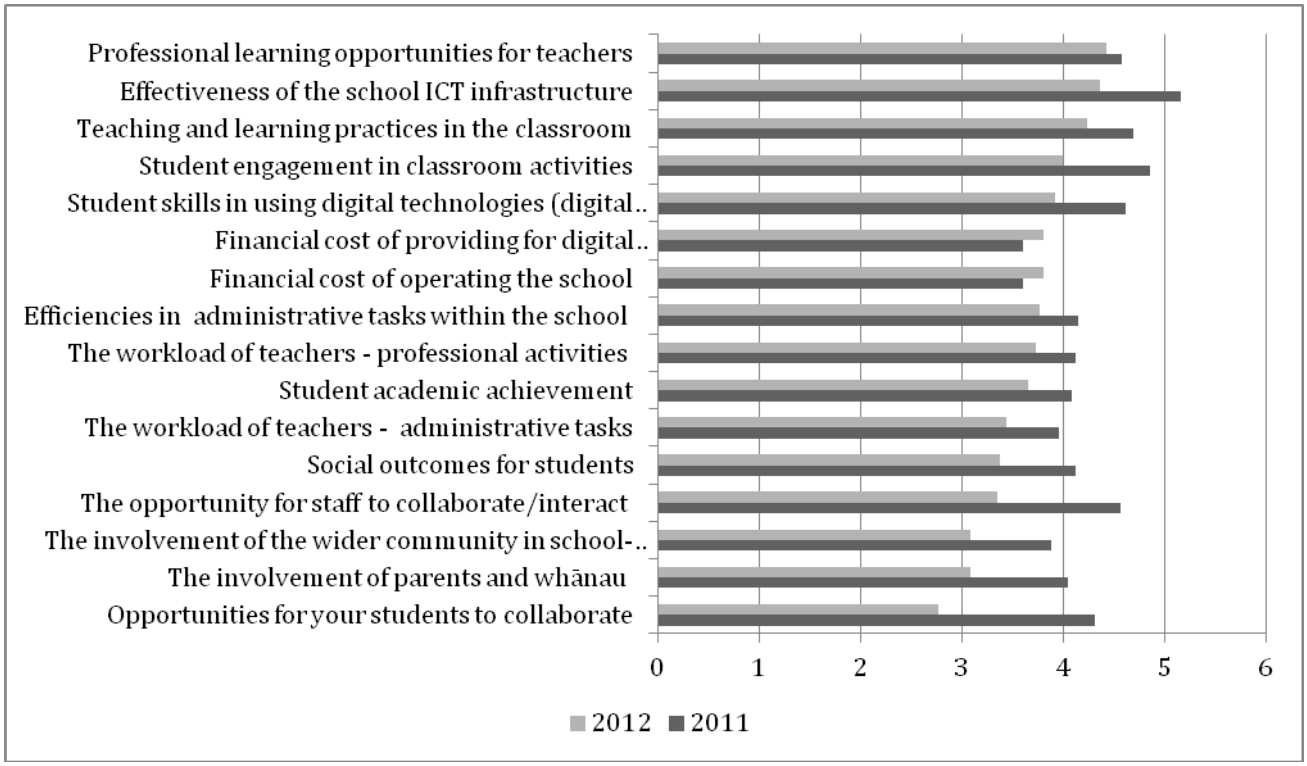


Figure 3: Comparison between expected and reported impact (principals).



The graphs are ordered by the 2012 reported levels of impact, from highest to lowest. As the 2011 pattern of mean levels in both show there appears to be minimal correlation between expected and reported levels of impact. This is a little surprising as often there is a self-fulfilling prophecy effect – what you expect to happen is what happens. For these respondents, this does not seem to have been the case. It would be interesting, and of value, to better understand why this is so. It may be that their expectations were too high, that there has been insufficient time for their expectations to be met, or that they simply did not understand what the NEN Trial was offering in 2011. It could also be that they did not realise the level of change and, therefore, effort required to achieve the desired impact.

The areas of greatest difference are related to student use and collaboration beyond the classroom as well as infrastructure. These were some of the highest areas of expected impact in 2011 and some of the lowest in 2012. This suggests that something else was needed in the implementation of the NEN Trial; that the provision of capability alone is not enough to drive outcomes let alone benefits.

6.3 Changes to workload

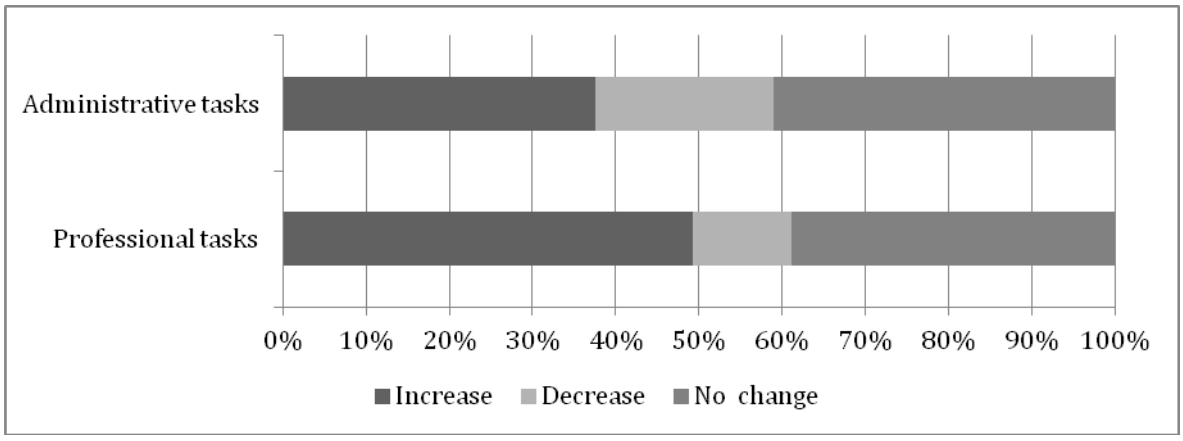
Any initiative that aims to change teacher practice can, at least initially, lead to an increase in workload rather than a decrease. In the case of technology, for example, this can include the necessity of finding and/or creating new resources or learning how to use new tools.

The teachers were, therefore, asked to indicate the direction of any change with regard to their workloads as a result of the NEN Trial, over the preceding 12 months. Their responses are shown in Figure 4. What is most obvious is the low number of teachers reporting a decrease in workload.

Of the 144 respondents for this question, 49% (n=71) reported that their workload with regard to *professional activities* had increased in the past 12 months. Only 12% (n=17) reported that it had decreased. The remainder reported no change (n=56, 39%)

There were similar findings with regard to *administrative tasks* with 37% (n=54) reporting an increase in workload, 22% (n=31) reporting a decrease and 41% (n=59) reporting no change.

Figure 4: Reported changes to workload (teacher responses)

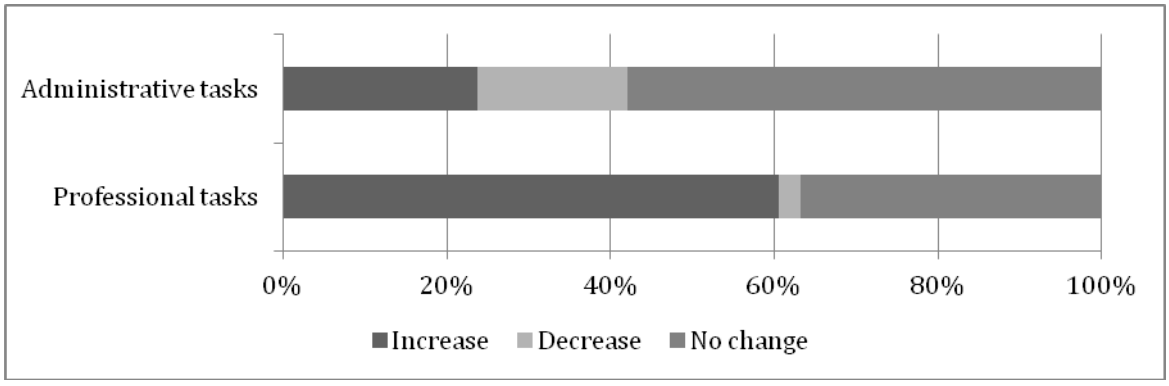


The principals were asked the same questions with regard to workload. Their responses are shown in Figure 5.

Of the 38 respondents to this question 61% (n=23) reported that the workload of teachers regarding *professional activities* had increased; 3% (n=1) reported it had decreased; 37% (n=14) reported no change.

The findings were different for *administrative tasks* with only 24% (n=9) reporting an increase; 18% (n=7) reporting a decrease; 58% (n=22) reporting no change.

Figure 5: Reported changes to workload (principal responses)



While a comparison between these two groups is somewhat problematic, given they are from different schools, the following is worth considering.

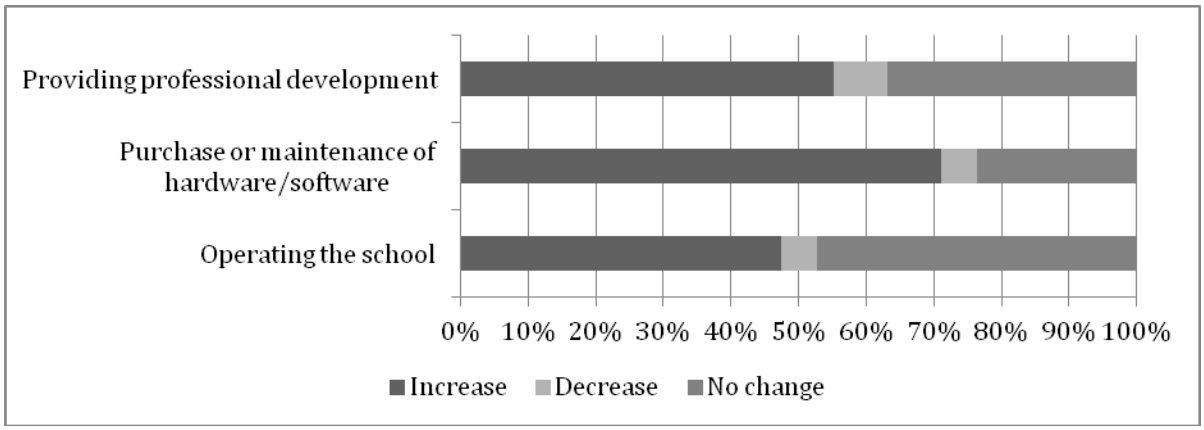
The teachers were more likely to report both increases and decreases to administrative workloads. The principals were more likely to say there had been no change.
The teachers were much more likely to report a decrease in their professional workloads and the principals an increase.
The differences were not as great for administrative workloads as professional.

6.4 Financial impact

The principals were also asked to indicate the direction of any impact of the NEN Trial on financial costs at their school in the preceding 12 months. As Figure 6 shows very few principals reported a decrease in costs. The increase in costs related to equipment is supported by the comments in the Appendices where principals report making decisions around upgrading or installing wireless, server upgrades and more devices for teachers and/or students.

With regard to the *financial cost of operating the school* (administrative costs) 47% (n=18) reported an increase, 5% (n=2) reported a decrease and 47% (n=18) reported no change.
With regard to the financial cost of *purchasing new hardware/software, or maintaining what they have,* 71% (n=27) reported an increase, 5% (n=2) reported a decrease and 24% (n=9) reported no change.
With regard to the financial cost of providing professional development/learning opportunities for their staff related to digital technologies 55% (n=21) reported an increase, 8% (n=3) reported a decrease and 37% (n=14) reported no change.

Figure 6: Changes to financial costs



This has direct implications for the Network for Learning. While there are stated benefits related to cost efficiencies for schools it may be that schools will have to make some large initial outlays to enable them to realise the affordances of the Network for Learning. This is particularly true in the areas of wireless connectivity, server upgrades and devices for students. Each of these has been noted by the respondent principals as future decisions, or recent changes.

In determining whether the expected cost benefits are achieved it may be necessary to take into account what additional purchases schools have been able to make – that is a value added analysis rather than a direct comparison of outlay.

6.5 The value of being on the NEN Trial

Both groups of respondents were asked the extent to which being on the NEN Trial had met their expectations overall. They were also asked how worthwhile they believed participation in the NEN Trial had been. As with other questions a six-point response scale was used from "not at all" through to "very high".

The teacher respondents (n= 145) reported that the NEN trial had met their expectations with regard to its impact on their teaching and learning practices between *slightly* and *moderately* ($\bar{x}$ = 3.5, sd = 1.385). They also reported a similar level of value in participating in the NEN Trial ($\bar{x}$ = 3.63, sd = 1.485); that is *moderately worthwhile*.

The principal respondents (n=38) reported that their expectations with regard to the impact of the NEN Trial on their school had been *moderately* met ($\bar{x}$ = 4.08, sd=1.265). They also reported that participation had been *moderately worthwhile* ($\bar{x}$ =4.35, sd =1.213). These mean responses are slightly higher than the teacher ones reflecting, perhaps, a broader view of impact from the principals.

The principals were also asked to provide an explanation for the ratings they had given the NEN Trial on the previous two questions (impact and value). These comments are in Appendix Five. The majority of the responses refer to the professional development and learning opportunities that the NEN Trial provided. There was only one comment directly related to access to a dedicated network leading to faster access, less cost and more information.

6.6 The influence of the NEN Trial on principal decision-making

Principals were asked whether participation in the NEN Trial had influenced any decisions they had made. Thirty-two principals indicated it had. These decisions were primarily strategic and involved the purchase of more devices for students and teachers (e.g. iPads, iPods, netbooks) and/or upgrading their wireless networks and servers including considering cloud-based options. Some spoke of considering whether BYOD was a good option or actively planning to implement it. Others talked of increased professional development. Their comments are provided in full in Appendix Three.

6.7 Major changes in the use of digital technologies

Principals were also asked if there had been any major changes related to the use of digital technologies in their school in the previous 12 months. Thirty-three indicated there had been. As with the question regarding decision-making the most common changes related to wireless, school networks and student access whether through BYOD or purchasing more devices. Their comments are listed in Appendix Four. Both the changes and the decisions made seem to be focused around provisions for students. These include wireless access and more devices either through 1:1 computing schemes (school owned) or BYOD. The nature of the BYOD seems to vary from one or two year groups through to student "volunteers". This supports notions of a possible shift, over time, from a teacher-centric focus on the provision of technology to one that is more student focussed. The extent to which such a shift will lead to a greater impact on the learning experiences of students will depend on the quality of the use of the digital technologies. If they are used within a paper-based paradigm it can be suggested that they are unlikely to have any marked influence on either outcomes or motivation.

6.8 The impact of different features of the NEN Trial

The principals were also asked the extent to which they thought certain features of the NEN Trial had benefitted their school. A similar six point scale was used as in previous questions ranging from 1 = no benefit at all through to 6 = very high benefit. Table 8 summarises the responses to this question. Respondents could indicate that they had not received a particular feature. The number of respondents indicating this is shown in the table in the NR column.

Overall, this group of principals reports the mean level of benefit from each of the features of the NEN Trial was at least *moderate*. However, for each feature the full range of possible responses was included from *no benefit at all* through to *very high benefit* for each item. This explains the high standard deviations. It is interesting that the technical features have higher reported means than those related to professional development, despite the dominance of professional development in the principal comments. The mean levels of benefit for both *access to ultrafast broadband* and *network upgrades* were above 5.00 on the six point scale used.

It may be the seven reporting they did not have access to broadband is because their school was already on ultrafast broadband and as such they did not see access as a feature of the NEN Trial.

Table 8: The reported levels of benefits for various features of the NEN Trial

	$\bar{x}$	SD	NR (n)
The access to ultrafast broadband	5.32	1.254	7
Having our school network upgraded (SNUP)	5.14	1.525	9
The opportunity to work with other schools/teachers in a loop/cluster	4.75	1.534	2
The regional support provided through professional development	4.73	1.518	1
Having access to KAREN	4.26	1.499	0
The technical support provided by the wranglers	3.97	1.540	3

7.0 PROFESSIONAL DEVELOPMENT AND LEARNING

The professional development opportunities provided through the NEN Trial have been described as the reason for the levels of reported impact and value by many of the principal respondents. This seems to have been the most readily identified feature of the NEN Trial. As mentioned earlier in the report, the evaluation team had concerns over the nature of the professional development being offered and its value in terms of the facilitation of a National Educational Network...

In this section, the findings reported relate to the regional support provided and any other professional development undertaken by teachers over the 12 months from July 2011 through June 2012.

7.1 Regional support (school level)

The principal respondents were asked to indicate whether anyone from their school had been involved in professional development provided through the NEN Trial (regional support). Of the 39 respondents to this question 67% (n=26) reported they had; 18% (n=7) said they had not; 15% (n=6) were not sure. Those indicating "no" were predominantly from the Proof of Concept schools and not part of the Wellington loop.

Those who reported that their staff had been involved were then asked what areas the professional development provided through regional support had covered. Six potential areas were listed but respondents could also name other areas. They were given six responses to choose from for each area: not provided; provided for all teachers; provided for some teachers only; provided for ICT lead teachers (or equivalent) only; provided for school leader(s) only; provided for technician(s) or similar only.

Table 9 summarises their responses. The percentage is based on the 22 respondents to the questions. The key points from these data include:

45% (n=10) of the respondent schools did not receive any *technical support* professional development. This was the highest percentage for the *not provided* response. The other relatively high area for this response was the content and services on KAREN (n=6, 27%)

Only 41% (n=9) reported that all teachers in their school had pedagogical professional development related to how to use digital technologies in the classroom.

The same percentage reported that all teachers had professional development related to fostering collaboration beyond the school.

There is no noticeable loop pattern in their responses – as in schools from the same loops do not necessarily report the same professional development.

Nine principals (41%) reported someone from their school had been involved in all six types of professional development; ten (45%) reported four or five types; three (14%) reported two or three types.

These data suggest that professional learning in these schools tends to have been directed at specific groups of teachers rather than at the whole school. This could explain the wide variation in use. It also suggests that in many instances the integration of digital technologies may not be a school wide focus.

Also of note, is the similar proportion reporting pedagogical professional development in the *use of digital technologies in the classroom* as for *fostering collaboration beyond the classroom*. In both instances, 41% of schools report that all teachers have received professional development in this area. This suggests that schools are at different stages on a pathway from paper-based to networked.

Table 9: Number and percentage of respondents reporting different areas of professional development (NEN Trial)

	Not provided	All teachers	Some teachers	ICT Lead teachers	School leaders	Technic -ians
How to trouble shoot/remedy technical issues such as Internet connections, computer viruses, online tools	10 45%	2 9%	2 9%	1 5%	1 5%	6 27%
How to use specific tools and/or software (technical professional development – skills based)	2 9%	8 36%	3 14%	8 36%	1 5%	0
Pedagogical professional development related to how to use digital technologies in ways that enhance teaching and learning in the classroom	3 14%	9 41%	6 27%	3 14%	1 5%	0
Pedagogical professional development related to how to use new digital technologies in ways that foster collaboration and interaction with the world outside the classroom	3 14%	9 41%	7 32%	2 9%	1 5%	0
Internet safety	2 9%	11 50%	3 14%	4 18%	2 9%	0
Content and services on KAREN	6 27%	2 9%	3 14%	4 18%	4 18%	3 14%

The *other* responses reported were:

e-asTTle training for the school leaders
a visit to the National library scoping regional strategies for a group of teachers
work on single sign on by the technician
The deployment of new technologies for the ICT lead teacher
Visits to BYOD schools for a group of teachers

Those principals whose schools had participated in the regional support were also asked how satisfied they were that the professional development support provided had met the needs of their school, in regards to the use of digital technologies to enhance teaching and learning. There were 24 responses to this question. The mean level of reported satisfaction was 4.71, on a six-point scale (sd = 0.789). This equates to the respondents being *highly satisfied* overall. Of these 24 responses 15 (63%) were from Ashburton schools and 6 (25%) were from Nelson schools.

The principals were also asked if there were any general comments they wanted to make about the professional development provided. Their responses are provided in Appendix Six.

7.2 Professional development outside the NEN Trial (school level)

The principals were also asked about any professional development opportunities their staff may have been involved in with regard to the use of digital technologies, outside of the NEN Trial regional support. Thirty principals responded to this section.

As with the regional support question, respondents were provided with a list of possible areas and participant groups. The only difference between the two questions was the removal of the KAREN Item. Table 10 summarises their responses regarding professional development not related to the NEN Trial. Points to note include:

Three schools reported "other" forms of professional development related to a learning or student management system. Participants in these were a variation of either all teachers or some teachers.
Fifteen (50%) of the principals reported someone in their school had been involved in all five types of professional development; nine (30%) reported three or four types, six (20%) reported one or two.
As with the regional support the largest numbers were reported for the use of specific tools and pedagogical professional development. However, again, less than half of the respondents reported *all teachers* receiving this professional development.
Of note is that for both sources of professional development there appears to have been very little for the school leaders as a group. If digital technologies are to have a lasting and deep impact on schools it is important that school leaders are part of the change process.

Table 10: Number and percentage of respondents reporting different areas of professional development (not NEN Trial)

	Not provided	All teachers	Some teachers	ICT Lead teachers	School leaders	Technic -ians
How to trouble shoot/remedy technical issues such as Internet connections, computer viruses, online tools	10 33%	2 7%	8 27%	2 7%	1 3%	7 23%
How to use specific tools and/or software (technical professional development – skills based)	6 20%	12 40%	6 20%	4 13%	1 3%	1 3%
Pedagogical professional development related to how to use digital technologies in ways that enhance teaching and learning in the classroom	5 17%	14 47%	6 20%	4 13%	1 3%	0
Pedagogical professional development related to how to use new digital technologies in ways that foster collaboration and interaction with the world outside the classroom	7 23%	13 43%	4 13%	5 17%	1 3%	0
Internet safety	7 23%	12 40%	7 23%	2 7%	1 3%	1 3%

As with the regional support professional development respondents were also asked how satisfied they were that the needs of their school had been met by this professional development. The overall mean level of satisfaction reported was 4.35 (sd = 1.094). This equates to being *moderately satisfied* overall, which is slightly lower than that reported for the regional support. They were also asked to explain their satisfaction rating. Their responses are provided in Appendix Six.

In total, 18 principals indicated their school had been involved in both regional support professional development and other opportunities outside the NEN Trial.

7.3 Professional learning (Teachers)

Given that teachers may not be aware of how the professional development they experience is funded they were only asked about any professional development they had undertaken in the preceding 12 months. They were provided with a list of seven possible areas. There were 173 respondents to this question. Key points to note from these data are:

The integration of digital technologies into classroom practices and how to use specific tools/software were the most widely reported professional development areas (73% and 82% of respondents respectively).

The only other area reported by more than 50% of teachers was Internet safety.

Only 22% of teacher respondents reported professional development related to the use of Web 2.0 technologies specifically for collaborating with others.

Table 11: Number of teachers undertaking professional development by area

	n	%
How to use specific tools and/or software (technical PD – skills based)	142	82%
How to integrate digital technologies into classroom practice (pedagogical PD)	126	73%
Internet safety	99	57%
How to use web 2.0 technologies specifically for collaborating with others outside the classroom (parents, whānau, other schools etc)	60	35%
How to trouble shoot/remedy technical issues such as connecting to the Internet, computer viruses, software upgrades etc	49	28%
How your students can use web 2.0 technologies to work with others outside the classroom (Skype, video conferencing, blogs etc)	38	22%
How to use the NEN (KAREN Network) for teaching and learning	22	13%

The respondents were also able to identify any other areas of professional development not included in the lists. Seventeen respondents indicated other forms of professional development. These were all related to specific tools or programs and were recoded into the appropriate category from the given responses. They included the following:

e-asTTle
Financial management programme for budgeting
KAMAR
Facebook
Moodle
ePortfolio

Google Docs

They were also asked to indicate the type of professional learning or support they had received over the previous 12 months. They were offered nine choices. There were 169 respondents to this question.

Table 12: Number of teachers receiving different types of professional development.

	n	%
Self-taught as needed	156	92
Informal support/guidance from colleagues at school	155	92
In school workshops/sessions led by a member of staff	153	91
Informal support/guidance from students	108	64
Informal support/guidance from family and friends	106	63
In school workshops/sessions facilitated by an external provider	95	56
External workshops/sessions for two days or less	43	25
External online or blended courses (e.g. through a university)	21	12
External face-face course over a sustained period of time (e.g. through a university)	12	7

What these data highlight is the extent to which "informal" professional development dominates. Where they are more formal workshops or sessions, the most common are those delivered by other staff members.

While this is in many ways a positive, as it suggests that "just in time" support that is appropriate to their context is being offered, there is also a risk. The risk is related to the level of expertise within their school and the danger that current practices are reinforced rather than new ways of doing things being explored. Further, there is a possibly that the learning needs of those teachers delivering the professional development are not being met, that they are not being extended or challenged to learn more themselves.

One of the factors driving the type of professional development offered could well be cost. It is certainly far cheaper for schools to send only one or two people to professional development, and for them to utilise internal facilitators. Other factors could include the availability of and access to appropriate expertise; staff workload and issues of finding relief teachers; and other priorities for professional development. One of the benefits of a network *of* learners could be to promote more cross-school learning opportunities and to provide opportunities for path-finding teachers to work together from around New Zealand. This could in turn provide them with new ideas and information to bring back into their own schools. The use of web 2.0 technologies can remove the costs of travel and time for professional learning. They can also enable greater mobilisation of knowledge.

8.0 EXPERTISE AND CONFIDENCE

The teacher respondents in 2012 were asked about both their own expertise and confidence and that of their students in using digital technologies. Their responses are reported in this section. In addition, a comparison between their levels of confidence and expertise in 2011 and those in 2012 is made for some items.

8.1 Teacher confidence and expertise

Respondents were provided with a list of six statements and asked to indicate how accurately each described their levels of confidence and expertise in using digital technologies. A six-point response scale was used: 1= not at all accurate, 2 = very slightly accurate, 3 = slightly accurate, 4 = moderately accurate, 5 = strongly accurate and 6 = very strongly accurate.

Table 13 presents the mean level of accuracy for each statement as reported by the respondents (n=174). Key findings include:

There is a relatively small range of means across these six items (3.76 to 4.76).
The two lowest levels of confidence are reported for the use of web 2.0 technologies such as Skype, blogs, wikis.
The respondents were always slightly more confident in their ability to use the tools than to facilitate student use.
Of particular note, the highest level of reported confidence was their ability to learn how to use new tools.
The very high standard deviations, for all items, highlight the range of confidence and expertise, or capability amongst these respondents. This is important when considering professional development and learning opportunities.

Table 13: Mean levels of reported confidence and expertise in using digital technologies.

	$\bar{x}$	SD
I am confident that I am able to learn how to use new digital technologies and applications to support the learning of my students	4.76	0.938
I am confident in my ability to use digital technologies to plan for and prepare a range of teaching and learning activities for my students	4.70	1.036
I am confident in my ability to use a range of digital technologies in my classroom to present material to my students	4.57	1.095
I am confident in my ability to facilitate opportunities for my students to use a range of digital technologies in their learning experiences	4.28	1.203
I am confident in my ability to use digital technologies in ways that enable me to collaborate and interact with others outside my school (e.g. using Skype, blogs, wikis, social networking)	3.85	1.402
I am confident in my ability to facilitate student use of digital technologies in ways that extend their learning experience and context beyond the classroom (e.g. using Skype, blogs, wikis, social networking)	3.76	1.470

8.2 Changes in confidence and expertise over time.

In 2011, the teacher respondents were also asked to report on their expertise and confidence. At that time only four items were included. After analysing the 2011 data it was determined that the additional items around extending teaching and learning activities beyond the classroom were needed.

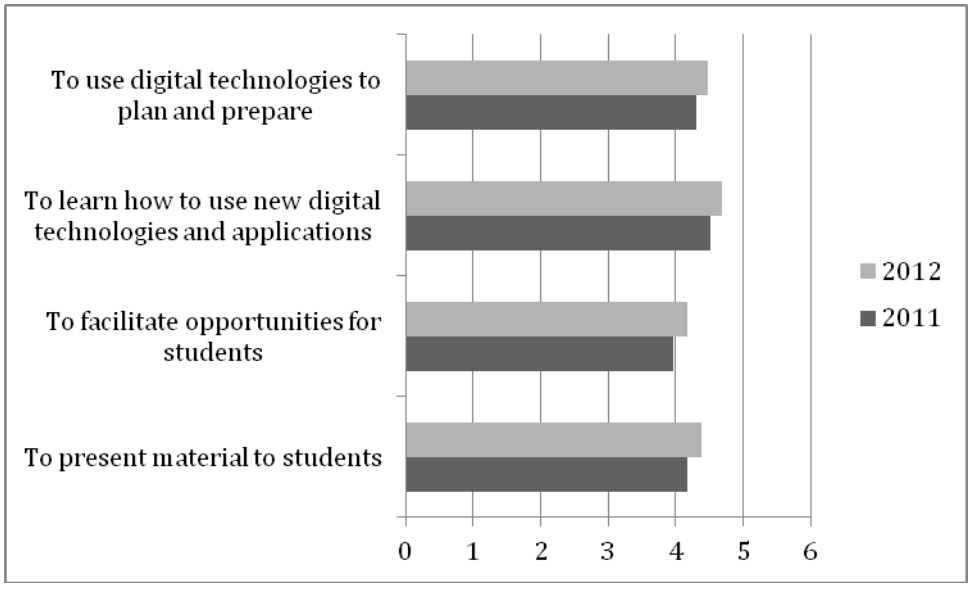
As Figure 7 shows, while there were increases in reported confidence and expertise in 2012 these were not large. None proved statistically significant when tested (Table 26, Appendix Seven). Given the focus on professional development this could be seen as disappointing, particularly given that the mean levels of reported accuracy for each statement remain around *moderately*.

These statements were very specific in terms of context – that is, it was about using tools to support student learning. It may be that this is an issue for some teachers – as in they know how to use something but are less sure of how to use it in their classroom for a particular learning outcome.

TPACK[23] (technological pedagogical content knowledge) refers to the intersection of three types of knowledge needed by teachers to successfully integrate technology into their classroom practices: technical, content and pedagogy. It may be that currently the focus is primarily on a combination of technical and pedagogical, rather than also linking the content-specific learning. It may also be that teachers are not yet confident in working in a context where technology has the power to disrupt traditional classroom practices and relationships. They may not be ready to give up the necessary control and to trust their students to a greater extent.

More work is needed to unpack what is required to raise teachers' levels of confidence with regard to the use of technology. The findings in this report would suggest that current professional development and learning opportunities have achieved all they can – that something more is needed.

Figure 7: Comparison of mean levels of reported confidence and expertise



[23] Go to http://tpack.org for more information.

8.3 Student expertise

The teacher respondents were also asked how accurate four statements were regarding their students' expertise. The same six point response scale was used as in the previous question.

Note that this will be based on their perception of their students' ability. Teachers are likely to determine classroom practice based on what they think students can do, so this perception is important. Discussions with teachers have suggested that they do not believe their students are always capable of using digital technologies, that they are not the digital natives they are purported to be by many. It may be that teachers often underestimate students' ability to use digital tools because students approach both the learning of, and the use of, these differently to many teachers. That is they are digital natives outside school – just not inside.

Given the likely importance of student age for this question primary and secondary responses were compared. Interestingly, the standard deviations remained large even within the same sector. As can be seen in Table 14 the secondary means are higher than the primary for all items, although not to any great extent. Other points of interest include:

These means are surprising low ranging from 3.32 to 4.32 overall. Even the secondary school means are only from 3.41 to 4.50. The question did ask about "all" students and as such this response will be an average across all students they teach. However, this does not alter the fact that, in general, respondent teachers do not believe that their students, overall, have a high level of expertise. It is this general view that is likely to drive their practice.

Particularly surprising are the low means for students using tools to collaborate with others ($\bar{x}$ =3.32 overall). Even the secondary school mean is only 3.43, which relates to *slightly accurate*. This would seem to confirm the suspicion that teachers do not understand the type of digital literacy their students display. Given the dominance of social media in their lives outside school, their ability to communicate with each other through a range of tools, this mean seems unrealistically low when considering the use of technology by the young outside school.

That teachers report higher mean levels of accuracy for the use of the Internet and for publishing work is not surprising. These are the most common activities in schools. Again, this would seem to confirm the idea that teachers do not always recognize the learning or expertise their students bring to school.

Table 14: Mean levels of reported accuracy with regard to the expertise of students

	Overall (n=176)		Primary (n=49)		Secondary (n=125)	
	x̄	SD	x̄	SD	x̄	SD
All my students are able to effectively use the Internet to search for material	4.32	1.328	3.80	1.569	4.50	1.177
All my students are able to effectively use digital technologies to present their work e.g. PowerPoint, Word	4.13	1.338	3.52	1.426	4.34	1.237
All my students are able to effectively use a range of digital tools (software and hardware) with minimal supervision/support.	3.70	1.293	3.38	1.480	3.78	1.202
All my students are able to effectively use digital technologies to collaborate with others outside the classroom in order to extend their learning experiences and contexts (e.g. using Skype, blogs, wikis, social networking)	3.32	1.222	2.93	1.358	3.41	1.126

9.0 The use of Digital Technologies for Teaching and Learning

In both the Teacher Survey and Principal Survey, there were sections specifically related to the use of digital technologies for teaching and learning. Three scales were used to measure the extent, nature and purpose of use. In the Principal Survey this was the *eLearning scale*. In the Teacher Survey the two scales used were a *Teaching and Learning scale* and a *Student Outcome scale*. Each of these is reported separately here. For all three, comparisons are made between the 2011 and 2012 responses of the matched samples.

9.1 The eLearning scale (Principals)

The principals' eLearning scale was comprised of 23 statements. These statements were grouped into three components[24]:

Culture is the extent to which the culture of the school community supports the use of digital technologies and eLearning.
Capability is the extent to which the staff and students of the school are able to use digital technologies in teaching and learning practices.
Collaboration is the extent to which digital technologies are used to collaborate with the wider community outside the school gate.
Respondents were asked to indicate the extent to which each of the 23 statements was an accurate description of the current situation in their school.

[24] These components were determined in the 2011 baseline survey analyses using a principal component's analysis (PCA).

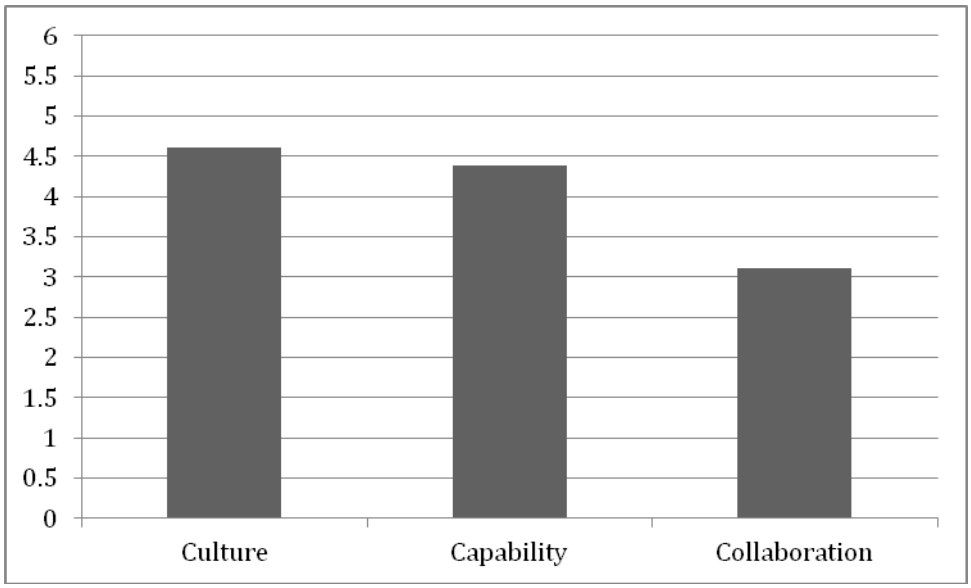
The response scale used was:

1 = not at all true (true less than 5% of the time or for less than 5% of the people involved.
2 = very slightly true (between 5% and 19% of the time or people)
3 = slightly true (between 20% and 39% of the time or people)
4 = moderately true (between 40% and 59% of the time or people)
5 = strongly true (between 60% and 80% of the time or people)
6 = very strongly true (more than 80% of the time or people)

9.1.1 The eLearning scale in 2012

Figure 8 presents the means for each of the components of the eLearning scale as reported by the 2012 sample of principals (n=48). The item means and standard deviations are in the appendices (Table 27, Appendix Eight).

Figure 8: Means for each component of the eLearning scale in 2012



Of note in the individual items is:

All of the items in the *Collaboration* component have means lower than those for the other two components. The range is 2.52 to 3.63). The range of means in the *Capability* component is from 4.17 to 4.75. For *Culture* the means range from 3.81 to 5.10.

The highest mean is related to the leadership in the school and the extent to which they support teachers to take risks and try new things ($\bar{x}$ =5.10). This was also the highest mean in 2011. Of interest would be the extent to which this view is supported by the teachers.

There are three items with means below 3.00. These relate to digital access for parents and whānau to their children's records of learning ($\bar{x}$ =2.46); students using digital technologies to work with

students from other schools ($\bar{x}$ =2.52) and teachers being guided by students on decisions about which digital technologies to adopt and how best to use them ($\bar{x}$ = 2.83).

The latter item is interesting as there has been a belief that students would drive transformation; that they would bring their expertise and digital knowledge to schools and push their teachers to change. This suggests that few teachers are utilising that expertise and knowledge.

9.1.2 Changes in components over time.

Figure 9 compares the mid 2011 and mid 2012 means for the matched sample of principals. The individual item means for this scale are in the appendices (Table 28, Appendix Eight). The mean ratings for all three components increased marginally from 2011 to 2012, but repeated measures ANOVAs of each component indicated these shifts were non-significant ($p > .1$ in all cases). For both 2011 and 2012 *Collaboration* was statistically significantly lower than either *Culture* or *Capability*.[25]

Figure 9: Comparison of 2011 and 2012 means for matched sample of principals

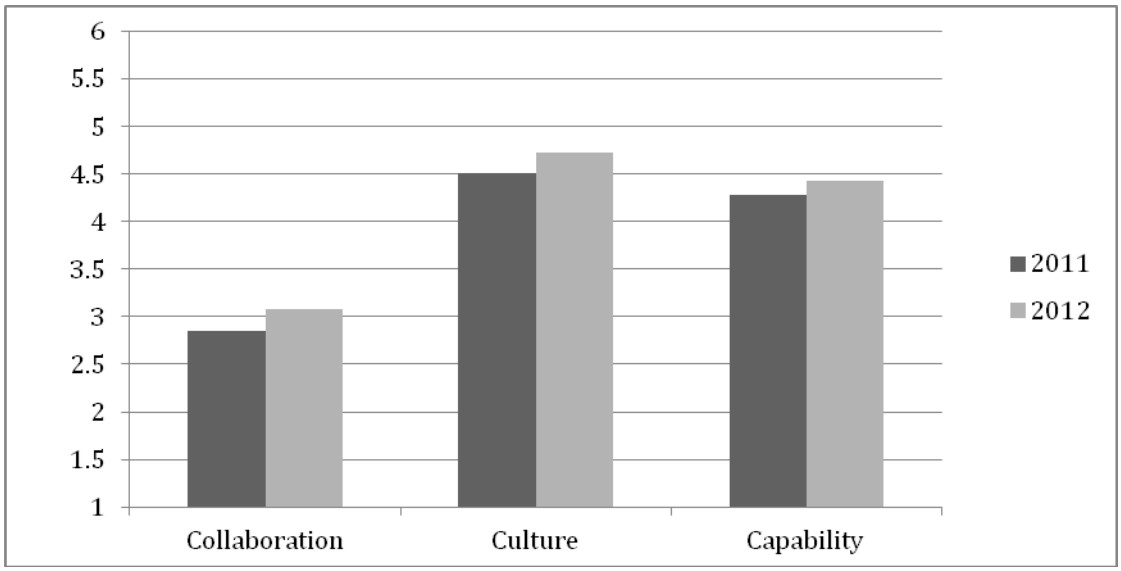


Table 28 also displays the differences between means across the two years for each item. It would appear that in these schools participation in the NEN trial has had a limited effect on teaching and learning in the first year of implementation. Some points to note:

The largest difference was 0.37. This was for the *involvement of teachers in professional development/learning related to the use of digital technologies in the classroom* and probably reflects the availability of additional support through the NEN Trial (2011 $\bar{x}$ =4.63; 2012 $\bar{x}$ = 5.00)

For two items the means are identical: the leadership in our school actively supports teachers to take risks and try new things in order to promote student learning and teachers in our school are guided by students on decisions about which digital technologies to adopt and how best to use them.

The mean difference for the item related to *student access to digital technologies* was 0.06 (2011 $\bar{x}$ =4.13; 2012 $\bar{x}$ = 4.19)

[25] Friedman tests showed that this difference was statistically significant in both 2011 and again in 2012 ($p < .001$).

While the two complete data sets for 2011 (n=62) and 2012 (n=48) are not matched it is worth noting that the differences between the means for each component are very similar as shown in Table 15. While there is a trend towards an increase in all areas it is very slight.

Table 15: Comparison of component means across 2011 and 2012 non-matched samples.

	x̄ 2011	x̄ 2012	Diff.
Culture	4.45	4.61	0.16
Capability	4.22	4.39	0.17
Collaboration	2.85	3.11	0.26

9.2 Using digital technologies in teaching and learning (Teachers)

A purposively designed scale was used to measure the extent and nature of the use of digital technologies in the classroom by teachers and their students. Teachers were asked to respond to 13 items describing different ways they or their students could use technology. The response scale used reflected a shift from awareness through to integration into the core work of teaching and learning.

This scale was:

> 1 = I am aware that these activities are possible but I do not see their relevance
>
> 2 = I am aware of the potential of these activities to enhance/enrich teaching and learning but don't have the necessary skills/knowledge
>
> 3 = I am beginning to explore/consider ways of integrating these activities and intend to do so in the future
>
> 4 = I/my students are beginning to do these things
>
> 5 = I/my students are occasionally doing these things
>
> 6 = I/my students are regularly doing these things as a core part of our teaching and learning activities

There were two components to this scale[26]:

Create refers to the use of digital technologies to create artefacts both through their development on the computer and sourcing them from the Internet

Collaborate refers to the extent to which teachers and/or students are using digital technologies to collaborate with other students, teachers and members of the wider community.

In addition, the items could be grouped by teacher and student use.

[26] These components were determined during the analyses of the 2011 data using principal components analysis (PCA).

9.2.1 The use of digital technologies in teaching and learning in 2012

Figure 10 compares the overall means for each component as reported by all respondents in the 2012 teacher survey (n=180). As with the 2011 baseline data the mean for the *Create* component ($\bar{x}$ = 4.96) is higher than for *Collaborate* ($\bar{x}$ =3.12).

Figure 10: Mean levels of awareness/use by component – all respondents 2012

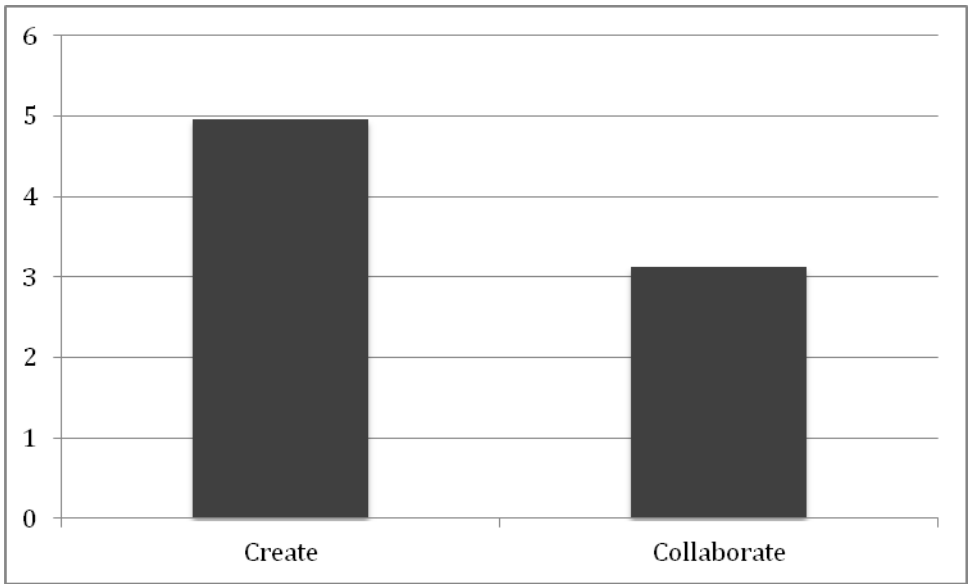
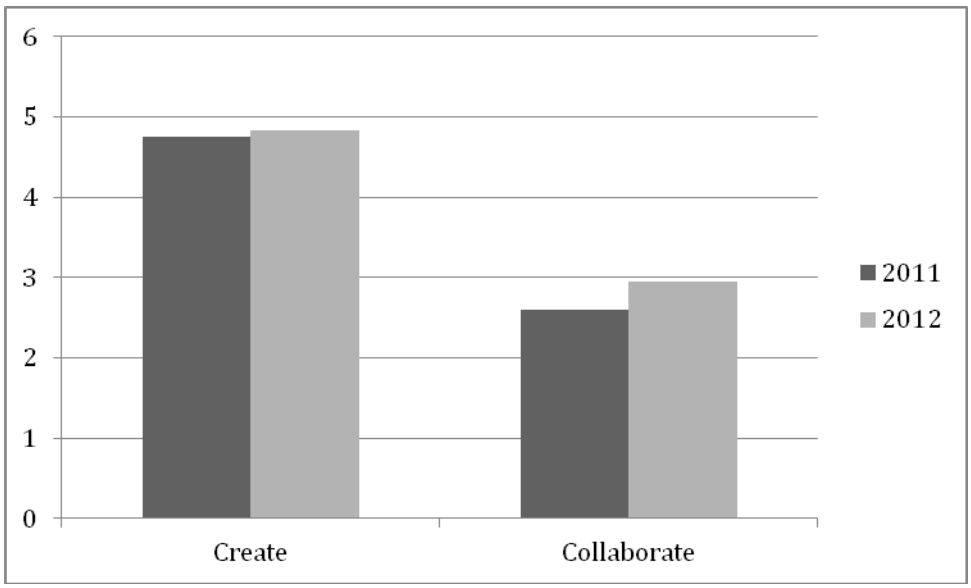


Table 30 (Appendix Nine) presents the means and standard deviations for all items in this scale. As for the eLearning scale in the Principal survey there is a clear delineation between the two components. The range of means for the *Create* component is from 4.43 to 5.40. For the *Collaborate* component the range is 2.70 to 3.58. This clearly highlights the differentiation in levels of awareness/use between the two components.

9.2.2 Changes over time

Using the broadly matched sample for 2011/2012 a direct comparison was made between their reported means for 2011/2012. As is shown in Figure 11 the means were very similar across the two years. The change for the *Collaborate* component was approaching statistical significance (Table 32, Appendix Nine.

Figure 11: Comparison of component means for matched sample of teachers 2011/2012



The comparison of individual items, within these components, is presented in Table 31 (Appendices).

The largest mean differences is 0.62 for the item *I create artefacts in a collaborative/interactive online environment with colleagues* ($\bar{x}$ 2011 = 2.88; $\bar{x}$ 2012 = 3.50).

All other mean differences were 0.35 or less reflecting the limited shifts in practice.

There were two items with a slight decrease in reported means. Both these were in the *Create* component.

None of the changes in individual items were statistically significant and many were not even practically significant given the nature of the broadly matched sample.

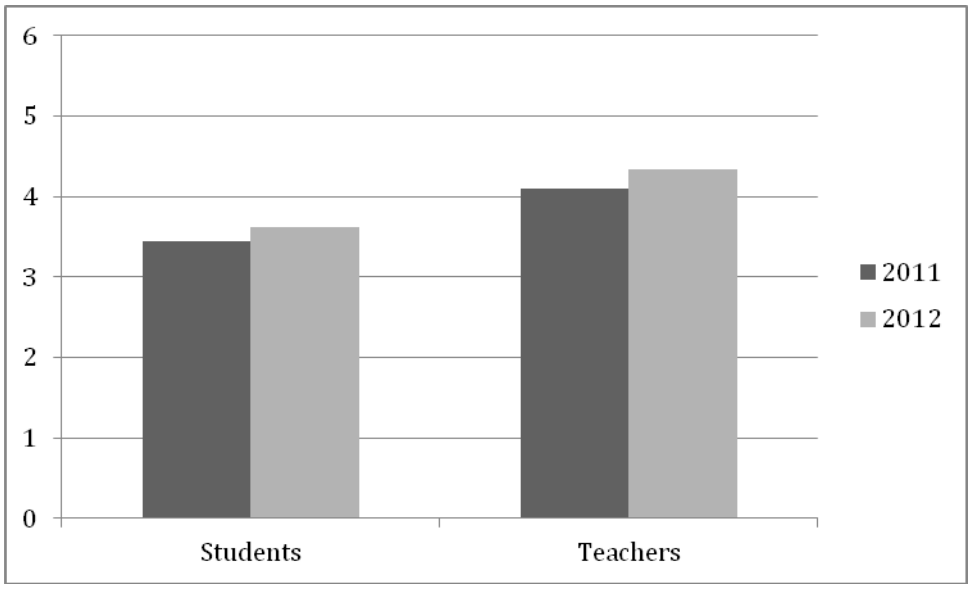
Although the two samples are not matched it is interesting to compare the two sets of means across all respondents for both samples (2011/2012). As Table 16 shows they are virtually identical suggesting there has been little change in teacher practice across the NEN Trial schools.

Table 16: Comparison of component means for all respondents 2011/2012 (non-matched samples)

	2011 $\bar{x}$ (n=185)	**2012 $\bar{x}$ (n=180)**
Create	5.05	4.96
Collaborate	3.10	3.12

In addition to the comparison for the two components consideration was also given to any shifts in the awareness/use as shown by teacher versus student use. In the 2011 data it was shown that teacher use was greater than student use. The same pattern was found in 2012 with no statistically significant shifts in practice (Figure 12).

Figure 12: Comparison of student use with teacher use for the matched sample of teachers 2011/2012



9.3 The Use of Digital Technologies for Student Outcomes (Teachers)

In both the 2011 and 2012 version of the Teacher Survey a scale was used to determine the extent to which digital technologies are used for different student outcomes. Respondents were asked how often, on average, their students used digital technologies for a variety of reasons. The response scale used was 1=never, 2= seldom, 3=once in a while, 4=fairly often, 5=very often and 6 = almost always. The scale used was taken from a survey developed in Australia for the Queensland Catholic Education Commission.

In 2011, three items were added pertaining to the New Zealand education priorities. These were removed in 2012. Also in 2011 teachers were asked to report their current and preferred levels of use. In the 2011 analyses it was found that the preferred levels were always higher than the reported current levels of use. It was also found that the differences in mean levels of reported use across current and preferred use was consistent[27]. This suggested that teachers wanted to do more of the same – rather than different things. They were not changing the "patterns" of practice in anyway.

There were two components for this scale:

Enhance which includes 14 items related to the use of digital technologies as a tool for ICT skill development and the enhancement of learning outcomes.
Transform which includes 6 items that address how digital technologies can be used to change what students learn and to support school reform.

[27] This material is reported in more detail in the NEN Trial report on the 2011 Teacher survey.

9.3.1 Student outcomes in 2012 (all respondents)

Table 33(Appendix Ten) presents the mean levels of reported use by all respondents in 2012 for the items in the student outcome scale. Also presented are the overall means for each of the components. As in the 2011 survey results the mean level of use for the *Transform* component ($\bar{x}$ =3.08) is lower than for the *Enhance* component ($\bar{x}$ = 3.64). Both these means are higher than the reported 2011 use but lower than the preferred levels of use also reported in 2011.

Key points include:

Across all items the means ranged from 2.85 to 4.10. This suggests the use of digital technologies between *once in a while* and *fairly often* for the different outcomes.

The highest reported use was to *support elements of the learning process* ($\bar{x}$ =4.10). This was the only mean higher than 4.00

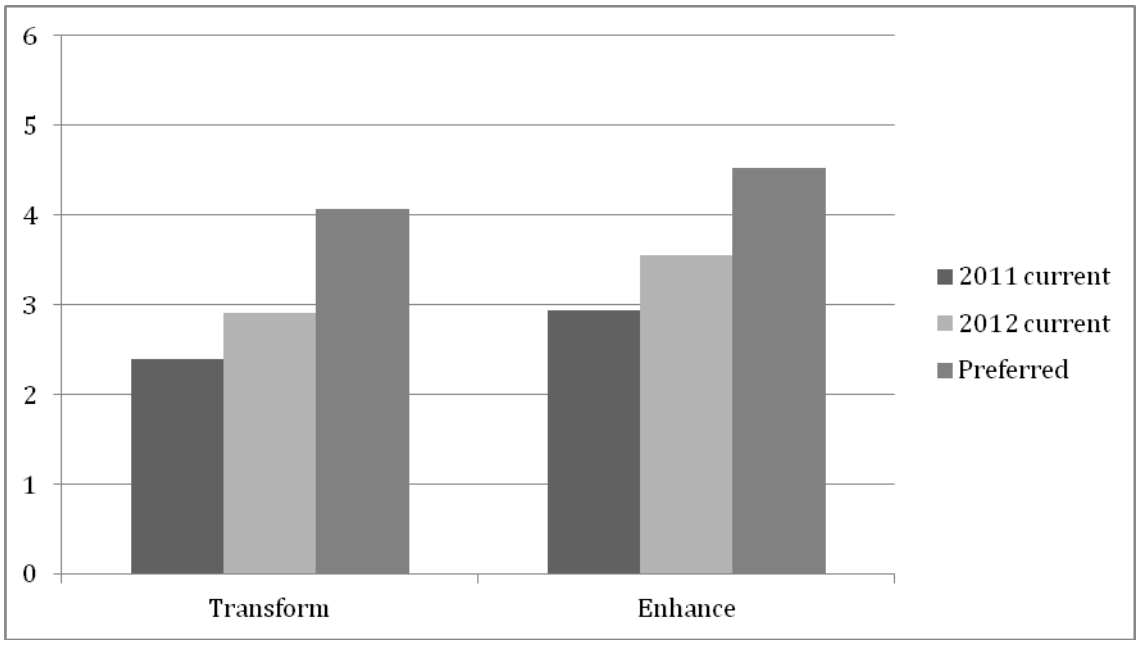
There were two items with means less than 3.00. These were critically evaluating their own and society's values ($\bar{x}$ =2.85) and understanding and participating in the changing knowledge economy ($\bar{x}$ =2.93).

Comparing the item means as reported by individual teachers most appeared to report consistent levels of use across the different items. That is, the extent of use of digital technologies by their students appeared to be relatively similar regardless of the desired outcome. The range of overall mean levels of reported use by teachers was from 1.40 through to 6.00.

9.3.2 Changes over time.

Table 34 (Appendix Ten) presents the means for both current and preferred use in 2011 and for current use in 2012 as reported by the matched sample of teachers. Figure 13 directly compares the three reported mean levels of use for the matched sample set. As it shows there has been an increase in levels of use for both components but this is still some way from the reported preferred levels of use.

Figure 13: Comparison of reported levels of use over time



A one-way ANOVA (Analyses of Variance) was conducted on each of the items to determine whether any of the differences found were statistically significant. The results of these ANOVAs are reported in Table 35 (*Transform* component) and Table 36 (*Enhance* component). (Both tables are in Appendix Ten).

The key findings for the *Transform* component are:

The differences between current and preferred use as reported in 2011 were statistically, significantly different for all items.

Current use in 2012 was also statistically significantly lower than the 2011 preferred use[28]

The overall component mean for current use in 2012 ($\bar{x}$ =2.91) was statistically significantly higher than that for current use in 2011 ($\bar{x}$ =2.40).[29]

For three of the items there was a statistically significant increase in use between 2012 and 2011. These items were: understanding and participating in the changing knowledge economy; communicating with others locally and globally; acquiring awareness of the global implications of ICT based technologies on society.

The key findings for the *Enhance* component are:

Again the differences between current and preferred use as reported in 2011 were statistically, significantly different.

The current use in 2012 was also statistically significantly lower than the preferred use reported in 2011[30].

The overall component mean in 2012 for current use ($\bar{x}$ =3.56) was statistically significantly higher than that reported in 2011 ($\bar{x}$ =2.94).

There were only three items where the differences between 2012 and 2011 were **not** statistically significant. These were: developing a scientific understanding of the world; engaging in sustained involvement with curriculum activities; undertaking formative and/or summative assessment.

These findings suggest that there has been an increase in student use of technology within the classrooms of these teachers for a wide range of outcomes. They appear to contradict those in the earlier section regarding the use of digital technologies in the classroom. However, that section considered the nature of the tools being used rather than the outcomes from that use. It may be that the same types of activities are occurring but for different reasons. It may also be that these outcomes are being achieved through a range of activities so there is no noticeable increase in any one activity.

[28] F>10, p<.01 for all items.
[29] F=8.67, p=.004
[30] F>10, p<.01 for all items.

10.0 DISCUSSION

In this section the data reported in this survey are discussed in the light of the theoretical framework outlined at the start of the report. The comments are based on these data, other literature and research undertaken both as part of the NEN Trial and by the evaluator at other times. The purpose of this section is to provide "food for thought" as the implementation of the N4L progresses.

The purpose of the NEN Trial, as evaluated here, was to understand the potential transformational impact of a national education network on teaching and learning practices, student outcomes and the school's administrative practices. The findings are based on self-report data by the principals and teachers involved.

The only area where any statistically significant shifts were found was in the use of digital technologies by students for different outcomes. It should be noted that this scale focused on student use for different outcomes – it was the outcomes that were transformational rather than the way they were achieved. This was a different focus to the other scales, which considered how students experienced teaching and learning. Understanding this and further considering the relationship of digital technologies with different outcomes would be of value. This would require more in-depth research than is possible with a survey tool such as this.

Perhaps extending the outcomes for students is the first step in changing the paradigm of teaching and learning? It could be argued that as long as education prioritises the results of standardised tests and silos of content there will be no transformation. If educational authorities, teachers and parents were to openly value and prioritise a broader range of educational outcomes for students, as identified in the New Zealand Curriculum, it may be that they would better recognise the full potential of digital technologies in education. Reframing schooling, its purpose and its design into a 21st century and networked paradigm would of necessity require a consideration of the tools and outcomes used in education. Perhaps it is time to question what the real benefits of education should be for students – and the role of formal education in that.

Arguably, the findings suggest there has been no transformational impact from the NEN Trial. The impact in all areas measured has been *moderate* at best. Even when asked about the overall effect of the NEN Trial the response remained *moderate*.

10.1 Explaining the findings

These findings should not be viewed as suggesting that connection to a national education network does not have the potential to be transformational. There are a number of possible reasons for the lack of impact, which need to be considered:

There was insufficient time for change to occur. The evaluation only covers one year and is across two school years.
The content and services available on KAREN did not meet the needs of the schools involved and a more school-aligned network will do so.
The teachers and students involved did not have the capability to implement a more networked model of teaching and learning.
The professional support provided did not meet their needs or have a broad enough reach.

The school infrastructures were insufficient to enable the use of KAREN to the extent required for change, particularly with regard to student access.
The schools – and potentially the regional support providers – were looking to enhance current practice rather than transform it.
The school cultures do not support risk taking or innovative practice.
It is likely that all of these explanations play a part. Schools are not only highly complex systems; they are also conservative by nature. This conservatism appears to have been strengthened by recent increases in accountability and the pressure of National Standards. Whether this is necessary is not discussed here but one could argue that perhaps innovation is needed to achieve the changes to student outcomes that the new accountability regime is looking for? That more of the same will only achieve more of the same?

However, it is also possible that these intersect around one key point – school cultures and the perceptions of those responsible for what happens in a classroom and in a school. If teachers, school leaders and the authorities envisage the use of digital technologies within a paradigm that is closer to the 20th century than the 21st century there will be no transformation. The real potential of digital technologies, and in particular web 2.0 technologies, lies in their ability to support a networked and collaborative paradigm of teaching and learning, one that is student-centric, gives students control over their technology and enables individual learning.

Some of the explanations above are now considered in the light of these ideas and the data provided in this report.

10.1.1 It takes time

Time is the most commonly reported explanation for any failure to see change (along with budget) and there are instances where it is legitimate. Yes, it does take time, perseverance and commitment to change practice. However, one could have expected these schools to have been further down the digital/networked path than they were in 2011 when the NEN Trial was implemented.

Further, perhaps it is time to question whether time is a convenient rationale rather than a genuine reason for the lack of change. Digital technologies are not new in schools, nor is the associated professional development. How much time is needed, and at what cost?

The question also to be considered is the extent to which change was the goal of the participants in the NEN Trial. No amount of time will lead to change if the desired change is not clearly stated, and a journey mapped out.

In this instance, the extent to which time is an issue is not clear when compared with issues around the focus and nature of the implementation of the NEN Trial. What is clear is that the timing of the evaluation made it difficult to measure change; both with regards to the June/July timing and that there is only one year of data. There would be value in continuing to follow some of these schools through the next year of the NEN Trial.

10.1.2 Student access

Teachers report being only *slightly* to *moderately* satisfied with their school infrastructures. In particular, they are least satisfied with student access. The principals' comments reflect an increasing awareness of the need for wireless and BYOD, for more access for students.

The Ashburton case studies showed that where technology was in the hands of the students the teaching and learning practices were enabled to be different to those which can be described as the 'norm' in a paper-based classroom. This is supported in recent literature[31]. These data show that access is still limited particularly to devices for students. Further, our work in Ashburton showed evidence of inequities of access within schools based on teacher desire to utilise different technologies.

There are solutions for schools to ensure quality of access rather than quantity of access. These would require a rethinking of the way technology is portioned across the school. It would also require a rethinking in the way students use the technology and the nature of the use. BYOD remains the obvious solution for schools but for that to make any real difference it will need to be implemented within a different school culture to that of the traditional paper-based, teacher-centric model.

10.1.3 Professional development

The professional development provided appears to have been, in most cases, to selected teachers from within schools. This means the schools are relying on diffusion of the knowledge gained by these teachers across the school. The success of this will depend on the culture of the school and the extent to which it operates in a siloed paradigm, and the size of the school.

Further, most of the professional development has been informal and school-based. Few teachers appear to have been exposed to external experts, which means they are only hearing an internal message. Again the extent to which this is a problem will depend on the school culture and on the capacity of the internal facilitators.

There does appear to have been professional development around the use of web 2.0 technologies and ways of collaborating and interacting with those outside the school. However, teachers still report being least confident in this area. This may not be due to their ability to use the tools, which seems unlikely given their dominance in the corporate and social worlds outside the school[32]. It is more likely to be a lack of confidence in the management and implementation of that access for students, and an awareness of the value of doing so for student outcomes. The laptops for teacher study referenced earlier[33] highlighted the willingness of teachers to learn how to do something when they saw sufficient need to do so. Other studies, such as that undertaken in New Zealand secondary schools by Lorrae Ward, again referenced earlier, [34] suggests willingness and the ability to change are key factors.

Looking beyond the classroom is a major change in the traditional paradigm of teaching. It requires teachers to have a higher level of trust in their students and to give up some professional autonomy and control. It requires them to rethink their role. The question is whether the professional development provided supports them to change their thinking, to shift their perceptions – or

[31] Halverson, R. & Smith, A. (2008). How new technologies have (and have not) changed teaching and learning in schools. Journal of computing in Teacher Education, 26(2), 49-54.
SRI International. (2011). Innovative Teaching and Learning Research 2011 Findings and Implications. www.itlresearch.com

[32] As with the earlier reference to student use of technology one only needs to consider the extent to which New Zealanders have embraced social networking and the extent to which technologies are part of teachers' professional lives to see that they are able to use them – that the issue may be contextualised use.

[33] Parr & Ward, 2011.

[34] This work comes from a PhD study and has been published in various ways including journal articles and conference papers. For further information contact Lorrae Ward. The earlier reference is one example of the outputs from this study, Ward, Parr & Robinson 2005.

whether it merely shows them how to do something. This requirement to shift thinking may explain why most use of digital technologies appears to be a replacement for current paper-based activities rather than transformational.

The purpose of this is not to devalue the opportunities the regional support has provided, or the ability it has given the loops to support schools more directly. It is to raise the question of how professional development is best provided – and what – and who – it should focus on? There is no doubt there have been benefits from the professional support provided at a school and loop level.

The Network for Learning, through the use of web 2.0 technologies, could become an active learning community and the facility to support learning that is not bounded. As such it can do much to support changes to the quality and nature of professional development including how it is delivered.

10.1.4 A teacher-centric culture

Along with the clear divide between uses in the classroom and collaborative/interactive uses of technology beyond the classroom there was also a clear divide between student and teacher use. In all instances teachers reported doing something more themselves than their students doing it. They also reported being less confident about facilitating student use than using a digital tool themselves.

School and Ministry initiatives, until recently, appear to have focused on teacher use and access. It may be that the professional development, for example, focuses on teacher use of the tools rather than their students? The purpose of the laptops for teachers was firmly focussed on teacher use, on supporting their professional practice and learning. While this was important the real benefits of the laptops were seen when they were used to promote student activities.

Focussing on teachers is an easier route than providing for student access and expertise for two reasons. First, it is cheaper and easier to control. Second, and more importantly, in a teacher-centric, siloed paradigm of teaching and learning the teacher is the most important person. That digital technologies are so integrated into the professional practice of teachers is evidence of the success of ICTPD, of the laptops initiative, of SNUP, in enabling the digitalisation of teacher work. The question is the extent to which they have enabled the digitalization of student learning. These data suggest they have not done so to any great extent. Further, they suggest that while teacher professional and administrative work is predominately digital its nature has not changed greatly. Certainly the use of digital tools does not appear to have lightened their workloads in many instances.

The positive from this evaluation is there appears to be a growing awareness of the need to increase student access. The question remaining is whether this is because of a shift towards a more student-centric model, or whether it is just the ‘next idea’. Visits to some schools would suggest that even where students have access they do not always have ownership or control; that in many instances the delivery of learning is still teacher-centric. This is not always the case; the world-view of the teacher rather than the level of access for students appears to be the key determinant of practice. Teachers will find a way if they truly want to provide for student centric practices.

10.1.5 A fit for purpose network

The NEN Trial utilised KAREN, which was primarily designed to meet the needs of the tertiary sector. This would have been a pragmatic solution to providing a quick option. While some services were placed on KAREN for schools there was limited work done to ensure it was either fit-for-purpose in a primary and secondary sector – or that the participant schools understood what KAREN offered.

It has been suggested that the NEN Trial, in fact, offered dated services; that schools are increasingly looking to the Cloud and to options such as Google Apps or Moodle. Further, the suggestion is that some of the services offered did not work end to end, that services did not always run effectively at the provider end when being accessed over KAREN. This has not been monitored or reviewed as part of this evaluation.

The use of KAREN does not appear to have allowed for testing of content and services, there was not the flexibility required – or perhaps the necessary will to do so. This evaluation did not attempt to review the use of KAREN or why it does not appear to have been overly successful.

The finding simply is that there is a need to ensure any technical solution is fit-for-purpose and works end to end, and that this is monitored over time. Further, it is essential those using any Network understand what is available and how to best utilise it.

10.3 Avoiding a negative cycle

One of the key concerns from these data is that for teachers and their students to realise the educational benefits of digital technologies they have to use them in quality ways, focused on student outcomes.

The concern is that many school leaders and teachers – and educational authorities – want to see evidence of those outcomes before they are willing to promote sufficient use to attain them. With limited use there will be limited outcomes; particularly if that use is limited in terms of quality. The paradox those promoting the networked model and the use of web 2.0 technologies face is promoting their use sufficiently to enable sufficient evidence of success to be gathered so that others will follow, without that evidence.

The body of evidence is growing but the stories of success still need to be more widely shared. The pathfinders need to be supported so that they continue to take risks and to be innovative. They need to feel sufficiently confident to come out from under the radar. Those authorities making value judgments on school practice need to be cognisant of the potential for different ways to achieve the same outcomes and benefits. Currently, these pathfinders tend to be individuals within schools, teachers working largely on their own whose constructions of good practice include student centered approaches and the use of a large range of tools.

10.4 The evolutionary journey

The data reported here show a slight trend towards an increase in the use of digital technologies for teaching and learning. They do not show evidence of a transformation of the nature of teaching and learning. However, it is likely that the wide standard deviations reflect the extent to which transformative practices are actually business as usual in *some* classes.

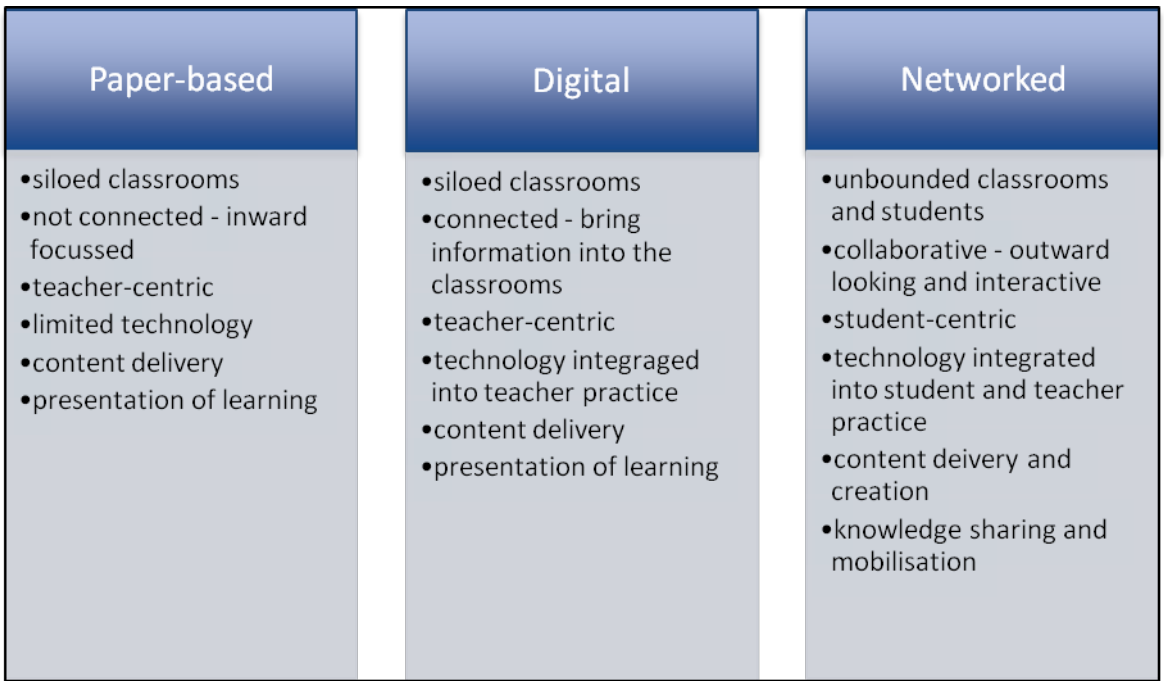
More importantly, perhaps, they show the journey that schools and teachers need to travel, a journey that individual teachers are at very different stages on. Ultimately, however, it is a journey that all teachers in a school need to be supported to take if real transformation is to occur for students.

This journey moves from a **paper-based** siloed view of education to one, which increasingly looks outward and utilises the Internet to access information in a range of ways. The second stage of the journey can be seen as the **digital** stage. Beyond this is the stage where schools are **networked**, where they are operating within a paradigm that recognises and utilises the potential of the world

beyond the school gate. In this paradigm teaching and learning are no longer siloed to within four walls. The interaction with the outside world is two-way.

The journey is complex and, as depicted in Figure 14, the stages involve a number of shifts and ideas. They have been named based on the nature of technology that is used to delineate the practices within each although they are about more than the use of technology.

Figure 14: The three stages of the evolutionary journey



10.5 Transforming teaching and learning

To reach the third stage, the networked stage, requires sufficient and fit-for purpose technology; technical capability. It requires students and their teachers to have access to digital devices and the Internet. They need to be able to move seamlessly between the physical classroom and the world beyond. Also required is pedagogical capability. Both teachers and students need to know how to use digital technologies to enhance learning. To note is that in the digital stage the focus has been predominantly on the teacher – on their technical and pedagogical capability – not the students. In the networked phase it is on the student, on their individual needs. Thus the pedagogical shift is primarily a shift from being teacher-centric to student-centric. However, these in themselves are not enough. Also required is what could be called 'paradigm capability'.

This 'paradigm capability' is the desire and ability to change perceptions and understandings; to alter the culture of schools and how teaching and learning is constructed. Even where technical and pedagogical capability are developed, real transformation of the learning experiences of students will not happen unless there is a shift in the understandings of students, teachers, school leaders, parents and educational authorities of what a "school" can look like in the 21st century, networked world. With this understanding and a vision for teaching and learning, that utilises the resources beyond the classroom, the benefits of an innovation such as the Network for Learning can be fully realised.

There is a sense of 'chicken and egg' when considering the three capabilities described above. Does the culture and perception come first or the technical capability or the pedagogical capability – or are they all needed at once? In reality, it is likely that the perception must be first developed. Those teachers who are the pathfinders have a world view that prompts them to do things differently to others. They have broader conceptions of what constitutes good practice and larger toolboxes on which to draw when meeting student need. They want to implement a different model of teaching and learning. They may not know exactly what that looks like but they are willing to find out.

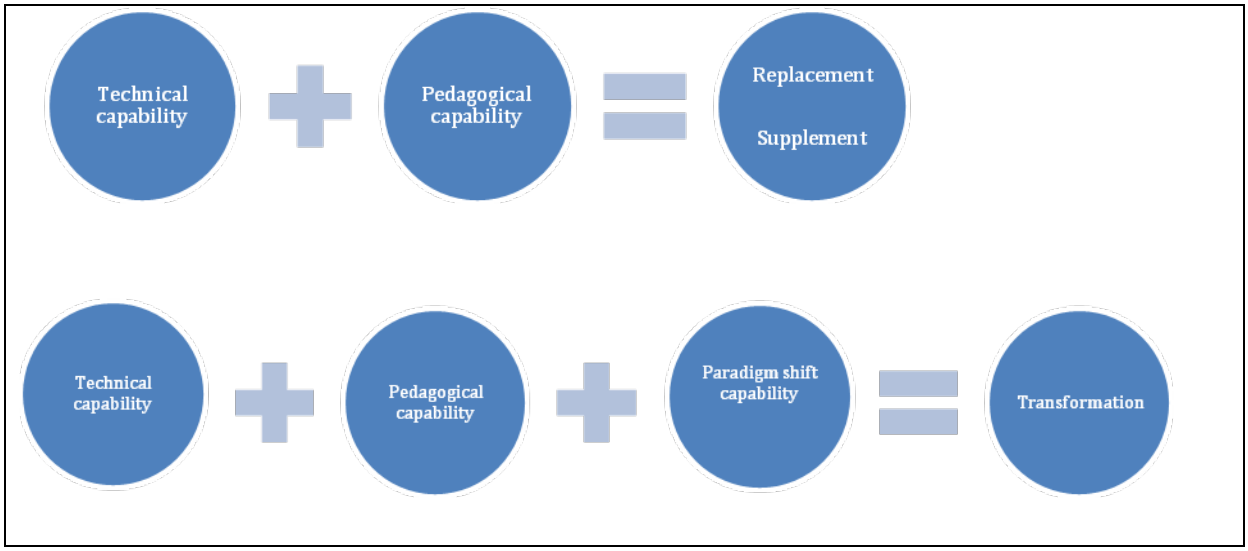
Others may need to be supported to shift their thinking and concurrently taught how to maximise the potential of the tools available to them, how to change the way learning occurs for their students. As is needed with students, professional support should be based on the current level and needs of the teachers and progressed from there. For many teachers change will only occur when they are shown practical examples of the benefits possible – they are not able – or willing – take the leap of faith required without that evidence.

Access for students and infrastructure is an issue, for example. But with innovative thinking the quality of use can be raised – it is better students are enabled to maximise the use of the digital tools available to them than that they have more access. Simply introducing BYOD or 1:1 programs will not be enough. It solves the symptoms not the cause.

What may be missing is the necessary professional learning for school leaders to help them understand the potential transformation of their school from a bounded learning context to a networked one – and what is required for that to occur. Perhaps the link between the affordances of digital technologies and the overall culture of the school, the way things are done, has not been made. As has been shown by the support schools have given for the eProfile concept they are looking for signposts, ways to measure their progress and a sense of where they should be heading.

To date the approach to transformation has been staged, now is the time to bring it all together, to recognise the need to promote transformation while developing technical and pedagogical capability. The paradigm shift will not come from providing technical and pedagogical capability. Being able to shift paradigms is another capability – not an outcome.

Figure 15: Realising the benefits of technology.



11.0 MEASURING THE BENEFITS OF THE NETWORK FOR LEARNING

The NEN Trial was a test-bed for the Network for Learning. As such its evaluation provided a means of testing the measurement of the stated benefits in the business case.

The easiest benefits to measure for the Network for Learning will arguably be those related to administrative efficiency and cost savings for schools. These are “hard” benefits readily measured in dollars and hours. However, as these data show the participants in the NEN Trial evaluation predominantly report either an increase in both workloads and costs, or no change. This would suggest the Network for Learning may not readily achieve the “hard” benefits. What will be required is an understanding of the difference between short term increases and long term gains. Also required is an understanding of the cumulative effect and of value added costs. The Network for Learning may well mean schools spend more money initially, it may also mean that they are able to purchase more devices.

Far more problematic are the changes to teaching and learning and student outcomes. That requires a rigorously designed longitudinal study that measures a series of points on a causal chain:

Capability: the extent to which teachers and students are able to access the affordances of the Network for Learning whether due to their expertise or the technical infrastructures in their schools.
Implementation (output): The extent to which schools, teachers and students are accessing the Network for Learning services and content and for what reasons.
Implementation (output): The nature and quality of use of digital technologies in teaching and learning within and beyond classrooms.
Implementation (output): Professional learning opportunities that support changes to teacher’s attitudes and values.
Outcome: The nature and extent of any changes to teachers’ attitudes and values.
Outcome: The nature and extent of any changes to teaching and learning practices and experiences.
Benefit: The nature and extent of any changes in student learning outcomes over time across a range of measures including non-academic outcomes and standardised, formal academic achievement.
The evaluation has provided an opportunity to trial survey tools for the measurement of the specific educational benefits of the Network for Learning. As shown in this, and other reports, these surveys have provided a wealth of information regarding teacher use of digital technologies in a networked paradigm. With larger sample sets, and more time, sophisticated statistical modelling could have provided detailed understandings of not only teacher practice but also the factors influencing that practice.

Combined with student achievement data and implementation (quality and quantity) data it would be possible to begin to unpack the extent to which digital technologies influence student outcomes and how that occurs. While student learning outcomes are the result of a complex interaction of factors the level of correlation between certain factors and outcomes can be determined with sufficient data. As such the benefits for teaching and learning of an initiative such as the N4L can be measured. The limitation is only in the quantity and quality of the data collected.

The evaluation did not attempt to measure student outcomes as a result of participation in the NEN Trial. To do so was beyond the resources of the evaluation team – and limited by the time frames of the evaluation. Although student non-academic outcomes were measured in the Ashburton case study research this work was primarily to pilot the survey tool. The length of time between iterations of the survey and the lack of an implementation measure mean the results from that research are indicative only. What it did show was the ability to measure such outcomes across all levels.

However, it is important that in any future evaluation of the Network for Learning student outcomes are included. The measurement of student outcomes is valid provided there is also an implementation measure and the ability to determine a correlation between student outcomes and the affordances of the Network for Learning. While this requires a rigorous quantitative design it can be done.

Finally, what is innovative in one context may not be in another. The converse also applies – what is business as usual in one class may be highly innovative practice in another. In judging the benefits of a digital initiative such as the Network for Learning it is important to remember this; to look at the value added not just the finishing point. Value should be added for all – not just those at the beginning of their journey.

APPENDIX ONE: SCHOOL DEMOGRAPHIC DATA TABLES

Table 17: Demographics of all NEN Trial schools by category.

Category	Proof of Concept (n=23)		Ashburton (n=24)		Christchurch (n=31)		Nelson Marlborough N=24)		TOTALS (n=102)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
School type										
Primary (1- 6/8)	8	35	21	88	9	29	12	50	50	49
Intermediate (7,8)	0	0	1	8			3	13	7	7
Composite (1 – 15)	3	13	0	0	3	10	0	0	6	6
Secondary (7/9-15)	11	48	2	4	15	48	7	29	35	34
Special school[35]	1	4	0	0	1	3	2	8	4	4
School size (student roll)										
Very small (0-99)	2	8	10	42	1	3	3	13	16	16
Small (100-199)	3	13	5	21	2	6	0	0	10	10
Medium (200-499)	3	13	8	33	11	35	13	54	35	34
Large (500-899)	5	21	0	0	7	23	4	17	16	16
Very Large (900-1499)	7	29	1	4	6	19	4	17	18	18
Extra Large (1500+)	3	13	0	0	4	13	0	0	7	7
Decile										
Not applicable[36]	2	8	0	0	1	3	2	8	5	5
Low (1 – 3)	2	8	1	4	2	6	2	8	7	7
Medium (4 – 7)	5	21	8	33	17	55	13	54	43	42
High (8 – 10)	14	58	15	65	11	35	7	29	47	46
School location[37]										
Not applicable	1	4	0	0	0	0	0	0	1	1
Rural	5	22	14	58	0	0	0	0	19	19
Minor urban	3	13	0	0	0	0	5	21	8	8
Secondary urban	0	0	10	42	0	0	2	8	12	12
Main urban	14	61	0	0	31	100	17	71	62	61

[35] Special schools include schools for students with special education needs and the Correspondence School.
[36] Not applicable is because these schools do not have standard decile or location ratings because of their nature.
[37] School location categories are used by the Ministry based on the population of the local area. Main urban > 30,000; Secondary urban 10,000 to 29,999; Minor urban 1,000 to 9,999; Rural <1000

Table 18: Respondent school demographics 2012 and 2011/2012 matched sample

Category	2012 Teachers (n=26)		2012 Principals (n=45)		2011/2012 Teachers (n=16)		2011/2012 Principals (n=32)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
School type								
Primary (1- 6/8)	12	46	26	58	9	35	20	44
Intermediate (7,8)	1	4	1	2	0	0	1	2
Composite (1 – 15)	1	4	3	7	0	0	2	4
Secondary (7/9-15)	11	42	14	31	7	27	9	20
Special school[38]	1	4	1	2	0	0	0	0
School size (student roll)								
Very small (0-99)	3	12	9	20	2	8	8	18
Small (100-199)	3	12	5	11	3	12	3	7
Medium (200-499)	9	35	15	33	4	15	11	24
Large (500-899)	2	8	5	11	1	4	3	7
Very Large (900-1499)	8	31	9	20	5	19	7	16
Extra Large (1500+)	1	4	2	4	1	4	0	0
Decile								
Not applicable[39]	1	4	2	4	0	0	0	0
Low (1 – 3)	1	4	3	7	0	0	2	4
Medium (4 – 7)	14	54	19	42	7	27	12	27
High (8 – 10)	10	38	21	47	9	35	18	40
School location[40]								
Not applicable	0	0	1	2	0	0	1	2
Rural	5	19	12	27	5	19	10	22
Minor urban	3	12	6	13	1	4	4	9
Secondary urban	6	23	8	18	4	15	6	13
Main urban	12	46	18	40	6	23	12	27
Loop								
Proof of Concept	7	27	13	29	4	15	8	18
Ashburton	9	35	18	40	8	31	15	33
Nelson/Marlborough	3	12	8	18	2	8	5	11

[38] Special schools include schools for students with special education needs and the Correspondence School.
[39] Not applicable is because these schools do not have standard decile or location ratings because of their nature.
[40] School location categories are used by the Ministry based on the population of the local area. Main urban > 30,000; Secondary urban 10,000 to 29,999; Minor urban 1,000 to 9,999; Rural <1000

Christchurch	7	27	6	134	2	8	4	9

Table 19: Teacher personal demographics

The data in the 2011/2012 column is based on those teachers who were included from the 2012 respondent sample. Their demographics have been broadly matched with teachers from the 2011 sample to provide the matched set used for the comparison over time analyses.

		2012	2011/2012
Gender	Male	73	15
	Female	133	38
Age group	Under 25	5	0
	25-35	48	4
	36-45	60	15
	46-55	49	17
	55 plus	42	15
Years teaching	One or less	9	0
	One to two	5	1
	Three to five	25	1
	Six to ten	42	6
	More than ten	127	45
Teaching area	Years 0-3	25	8
	Years 4-6	18	8
	Years 7-8	5	2
	Years 9-10	42	4
	Years 11-13	116	30
Subject area	Primary	48	18
	Secondary home room	1	0
	Secondary English	22	3
	Secondary mathematics	15	4
	Secondary science	24	6
	Secondary social sciences	21	7
	Secondary physical education	10	2
	Secondary languages	9	1
	Esol/Special needs	10	4
	Visual arts	6	1
	Technology/media	22	3
	Drama/Music	9	0
	Other	8	3

Table 20: Principal personal demographics

		2012	2011/2012
Gender	Male	26	18
	Female	19	14
Age group	Under 30	1	0
	31-40	7	6
	41-50	8	5
	51-60	20	17

	60 plus	9	4

APPENDIX TWO: SURVEY CONTENT TABLES

Table 21: Survey content for Teacher's surveys

Area	Questions asked	2011	2012
General questions: Demographics Attitudes School use	Name of school	☐	☐
	Length of time as a teacher	☐	☐
	Subject area teaching	☐	☐
	Year group teaching	☐	☐
	Age	☐	☐
	Gender	☐	☐
	Amount of professional work done at home outside school hours	☐	☐
	Importance of digital technologies - overall use and access (5 items)	☐	☐
	Belief that the use of digital technologies supports policy outcomes	☐	☐
	Belief that digital technologies should be a priority for schools	☐	☐
	Extent to which school leadership values digital technologies	☐	☐
Comparison between schools	If they were not at their current school in 2011 – 7 questions comparing the two schools	☐	☐
Outcomes for students	Use of digital technologies for student outcomes 2011 – 26 items – 3 components (Enhance, Transform, Ministry) 2012 – 23 items – 2 components (Enhance, Transform)	☐	☐
Teaching and learning	Awareness of and use of digital technologies by both teachers and students (13 items) Includes two components – Create and Collaborate	☐	☐
Infrastructure	Satisfaction with features of infrastructure and PD (10 items)	☐	☐
Expectations, beliefs and impact	Impact across range of areas (16 items) 2011 – expected 2012 – actual reported	☐	☐
	Direction of impact in certain areas (5 items) 2011 – expected 2012 – actual reported	☐	☐
	Extent expectations met overall with regard to impact	☐	☐
	How worthwhile has participation in NEN Trial been	☐	☐
Expertise and knowledge	Current levels of personal confidence and expertise 2011 – 4 items 2012 – 6 items	☐	☐
	Current levels of confidence and expertise displayed by students (4 items)	☐	☐
Professional Development	Type of delivery of professional development received (9 items)	☐	☐
	Areas professional development received in 2011 – 3 items 2012 – 7 items	☐	☐

Table 22: Survey content for Principal's surveys

Area	Questions asked	2011	2012
General questions: Demographics Attitudes School use	Name of school	✓	✓
	Length of time as a principal	✓	✓
	Approximate amount of time teaching in current role	✓	✓
	Gender		
	Age	✓	✓
	Importance of digital technologies - overall use and access (5 items)	✓	✓
	Belief that the use of digital technologies supports policy outcomes	✓	✓
	Belief that digital technologies should be a priority for schools	✓	✓
	Influence of NEN Trial on decision making	✓	✓
	Any major changes due to the use of Digital Technologies in the school (open-ended if yes)	✓	✓
	Remote access to school server	✓	✓
Comparison between schools	If they were not at their current school in 2011 – 7 questions comparing the two schools	✓	✓
eLearning Scale	Description of current use of digital technologies in their school (23 items) Includes three components –Culture, Capability and Collaboration	✓	✓
Expectations, beliefs and impact	Reasons for joining NEN Trial	✓	✓
	Impact across range of areas (16 items) 2011 – expected 2012 – actual reported	✓	✓
	Direction of impact in certain areas (5 items) 2011 – expected 2012 – actual reported	✓	✓
	Extent expectations met overall with regard to impact	✓	✓
	How worthwhile has participation in NEN Trial been	✓	✓
	Open-ended question regarding impact and value of NEN Trial	✓	✓
	Benefits of different features of NEN Trial (6 items)	✓	✓
Professional Development	Nature of professional development in school in 2011	✓	✓
	Participation of the school in an ICTPD contract	✓	✓
	Involvement in regional support as part of NEN Trial	✓	✓
	Areas of PD support through regional support as part of NEN Trial	✓	✓
	Satisfaction with NEN Trial regional support provided	✓	✓
	General comments about NEN Trial regional support	✓	✓
	Areas of PD support from sources other than NEN Trial	✓	✓
	Satisfaction with other PD support received	✓	✓
	General comments about other PD support	✓	✓
New principals	Initial perceptions of NEN Trial (3 items)	✓	✓

APPENDIX THREE: PRINCIPALS' DECISIONS

Following are the comments made by principals with regard to decisions they have made that have been influenced by participation in the NEN Trial.

Previous school and this school are part of same NEN Trial. The decisions have been influenced by the trial and purchases are being speed up to allow more of the school to actively engage in digital technologies and online.

We have engaged CORE to audit the schools capacity and services. This audit will inform our strategic thinking for the next 3-5 years.

It has influenced future planning re: wireless and portable devices.

Scaled back expectations of current technologies and their utility in learning. The purchase of digital tools for staff and students Installation of UFB wireless throughout the College and upgrade of Server and technical support ($220k+)

Purchase hand held devices, iPads and iPods has given more access and hands on for students, more purchasing power. Purchase of interactive data projectors for each class, and use web 2 tools

Our equipment was relatively up to date but it has made me think about what we will purchase in the future or if we will encourage BYOD within the school. Decisions are now being made as to how to improve our wireless capabilities within the school and file storage and sharing (use of cloud technologies). Staff have been expected to attend relevant professional development sessions provided by MCFCS and encouraged to begin implementing these within their classrooms.

Seeking more ways to access staff PD. Looking at ways of funding extra IT equipment.

Purchase of iPads

Next year we are asking year 9 to bring a device. Staff have spent 2 years getting ready for this.

CORE Ed PD. GCSN Champions PD/meetings. Continued with informal PD within the school. PD within the school now includes information/assistance on using greater range of WEB 2 tools

We have prioritized our professional development this year to focus around digital tech, above and beyond our NEN trial PD. We have purchased some devices as a trial instead of replacing desk top computers.

We have committed to the professional development being offered by the MCFCS cluster. We are going to purchase 1-1 devices for our Y7&8s and significantly increase the ratio of devices for the other year levels

Great information and examples on iPads.

Considerable investment in ICTs

Commitment to provide one-to-one netbooks for Year 5-8 students. Commitment to professional development as provided by the Mid Canterbury Fibre Connected Schools network.

In the process of moving to a digital learning platform (LMS) and planning for BYOD

Changes to provision of IT from computer labs to more individualised - but not to BYOD yet.

We are using activboards in each room. Taking advantage of the PD provided by the Mid Canterbury school fibre optic cluster. Having conversations about BYOD and attending seminars about it.

We have set the school up (layout as well as purchasing specific devices) to make maximum use of new technologies and access to the Internet.

Digital devices for teachers PD for teachers review the school's ICT strategy

Helped us to go to 1:1
Made greater access for staff and students possible
Spending prioritisation
We needed the bandwidth to enable our 1 to 1 programme
Participating in my professional development and supporting our staff going to NEN workshops. As I am very new I have not made any purchasing decisions at this stage.
Links to City Loop and KAREN have been hugely influential and beneficial
Making sure we get the best value for money and buy wisely - we are looking at the laptop vs. iPad vs. iPod scenario - still to decide the best way to go
To implement a replacement policy, and ensure wireless access is school wide
Staff need professional development to keep up with students, digital devices are increasing in complexity all the time, students are more engaged with digital technology.
Has influenced priorities placed on teacher PD, purchase of digital equipment, hastened installation of wireless
Access to a wider range of ICT tools and appropriate PD.
It has underlined the importance of communities such as the Wellington Loop to developing teacher expertise across the curriculum.
Possibly, but perhaps participation in the NEN is part of the overall strategic direction, development of digital pedagogies and schooling improvement

APPENDIX FOUR: MAJOR CHANGES

The following are the Principals' responses with regard to major changes in their school in the previous 12 months.

Wireless up grade, Classroom computer upgrade and small pod of laptops. Server upgrade being looked into so staff can have access from home
Upgraded server. Thinking about where to next and beyond.
Wireless, Server upgrade
Telephone system is now over the Internet.
More wireless units - whole school covered - upgraded server
SNUP completed. Upgraded wireless system pending
The SNUP and wireless installation have allowed us to trial and implement BYOD
SNUP network upgrade completed. BYOD introduced. 3x12 netbook COWs introduced. 30 new desktop computers introduced throughout school. Wireless network started, server upgrades
Lease of notebooks for two classes for a three-year period. Further purchasing of wireless notebook pods to be used throughout the school. Purchase of 6 iPads to trial. Server upgraded at the beginning of 2011.
BYOD, Upgraded wireless upgraded server
Opened up the wireless network to our students and freed up the way the students access it
Major purchase and PD in touchscreen technology
Use of tablet devices
BYOD trial at Year 9 in 1 class. Installation of wireless started. Development of LMS started
Upgraded servers, SNUP upgrade
Activboards

Whole school is wireless; changes to policy to be more responsive to changes in technologies/social networking etc; keen to have BYOD - considering cloud more and use of apps more
Cabled and wireless internet access, many students opting to BYOD, increasing teacher engagement of ICT in teaching
iPads in Junior School
Wireless mode improved. More iMacs
BYOD/Wireless installed? Upgraded servers
Wireless upgrade and use of e-asTTle. Moved to use Google Docs teacher dashboard.
Electronic roll, change school management software, using asTTle in a different way to the past.
PD for staff Expectation of staff skills growth Increased staff confidence - no point in BYOD until that is in place We have 1:1 laptops in secondary school computers available for others and an I Pad trial happening
We have been SNUPed, are fully wireless, our server has been upgraded and we have signed a full technical service agreement to support the teachers and students
Currently looking at policy changes to control and manage BYOD
Wireless and introduction of BYOD's
Use of IWB and iPads.
Completed SNUP. This has increased our capacity to utilise hardware. It is this capacity that is creating demands which we are identifying and deciding just how to meet these demands. Participation in the Link Learning Cluster, a regional ICTPD initiative has also contributed to the increased use of ICT.
SNUP followed by installation of new wireless network
Increase in number of school provided mobile devices, COWS, School wide wireless capability, Use of social media for learning engagement, Focus on cyber safety, Clarity around school digital pedagogical focus, BYOD pilots, Operating system upgrade.

APPENDIX FIVE: PRINCIPAL REASONS FOR REPORTED IMPACT AND VALUE

The staffs are keen. The school resourcing has hindered the up take by staff and students
Heightened awareness and focus on incorporating ICTs into T&L.
I expected a lot of ideas or skills development. That's what we got. I perceive many useful ideas and ways forward, many of which we cannot afford.
Had trouble with the staff attending yet more PD each week. Time constraints are an issue
Fast internet is our main advantage with this trial.
Provision of professional development and the opportunity for local control to meet local needs. Our school is also involved in an ICT contract so we have needed to be selective for which PD to attend due to time commitments / overload.
It has confirmed things that we have currently been doing and thinking about doing and provided us with new ideas and options for what is possible digitally.
Having access to relevant PD.
We are limited by the lack of a SNUP upgrade.
As a school the Board and staff have moved a long way in their understanding of what is possible and effective.

MY OWN LACK OF KNOWLEDGE AND INVOLVEMENT FROM THE BEGINNING.
Initially our internal network couldn't cope. A couple of video conferences were tried unsuccessfully - our connection / equipment?? couldn't cope. Limited success only. After that I guess we lost interest / motivation.
SNUPed, Fibre access to internet. Having funding support for teachers to explore digital technologies and to participate in professional development has been valuable. Like most trials, progress has been slow and meeting the needs of all a challenge. Next step is to develop collaboration with other schools/students and further with teachers.
The potential is there and we are still on a journey. As we unpack more and more of the opportunities available the impact on learning and achievement will become more evident.
It has been hard to actually understand how to access the affordances of the NEN trial and it took some time for the loop we are in to actually be able to work in the NEN. The best thing has been the available PD we have been able to access
50% of staff use the NEN very well and the other half are consolidating their skills on devices.
The NEN trial has given us the impetus to start to address the use of digital technologies in the classroom to enhance learning. The NEN trial has allowed our school to participate in regional professional learning and development that has supported our planning towards greater use of digital technologies and the development of pedagogy that supports learning in this environment. We have had the opportunity to visit other schools, talk to teachers and leaders. We have had access to experts that have worked with us to help plan and start to make the changes that we need to as a school to take full advantage of the opportunities that UFB and IT offer for student learning.
NEN trial has allowed access to resources.
Staff are seeing more ways to use digital technology and asking for it to have a high priority in the next budget round.
Without this opportunity we would not have been able to move as far as we have. It has provided opportunities for teachers in particular to change their teaching strategies. We have tried to keep up with what others are doing and where we should be taking the children.
The trial has been vague in its goals and program - very difficult to understand what it set out to achieve and how it communicated these intents or support.
Enabled us to trial and implement new pedagogy with new media.
No significant programme of recommended activity or exemplars of use.
Difficult as an Independent School who receives no funding. We wish to grow collaboration and offer any of our story and learnings for development of others and for sharing ideas.
We have had support from experts, PD opportunities have been taken up, Term meetings with facilitator to discuss what we are doing and where to go next, guidance offered - ensuring the leadership of our school is aware of changes and developments in technologies
Teachers have access to sources they wouldn't have otherwise. Those who are proficient are able to access from the beginning of the trial. PD has increased that number of teachers but it takes time!!
We have already had a very technical set up. The participation made us reflect on use of our technologies and review how effective these uses are.
Has enabled us to move more rapidly with development of systems, PD on using devices
Access to a dedicated education service, faster access, less cost, more information

Wakefield is a member of the Nelson Loop, so this school has access to a fast connection speed. We have not noticed a huge difference in speed or access for our school. The greatest benefits of Loop membership has been the professional development opportunities and collegial support that has been on offer locally.
Access to UFB through the Wellington Loop has reduced technical barriers of access. We have greatly benefited from being part of the wider community which the Loop has provided. The funding for regional support and the wrangling has been a great boost for the Loop.
Supported the digital strategic direction of the school.

APPENDIX SIX: PRINCIPAL COMMENTS REGARDING PROFESSIONAL DEVELOPMENT

Regional support

Very professional and with a wide variety offered.
Cluster PD cannot by its nature attend to just in time learning.
Lots of handy ideas. Our school is not in a position to make the most of them.
Lots of focus on meeting primary setting and student needs. Not a lot appears to be planned with a secondary focus.
The sessions have all been highly informative and run by a variety of providers which gives schools people to contact/call upon when they are making decisions or solving problems. There have been so many great ideas we as a school now need to take time to make decisions about what we do and where we go from here.
The Nelson Loop has worked hard to provide training and has met every request we have had.
Great learning opportunities especially with latest technology, which has really helped in decision making - wireless, server, BYOD.
As stated before, it has been hard to meet the needs of such a vast group. We are only now beginning to have more differentiated programmes. Some of the providers of PD have not been of high quality, which has led to some apathy in attending future opportunities.
The PLD provided through the Nelson Loop has been high quality, informative and substantial and it would be great to be able to offer this level of PLD to all staff.
Very needs focused so, therefore, was very useful. Allowed good collaboration between schools and teachers.
PD is always beneficial but expensive when reliever costs are taken into account - we need to fit within the budget so we are not always able to take up all the PD we would like to participate in. It is purely a financial matter and not one to do with interest or willingness.
Under the auspices of The Loop there has been a wide range of opportunities offered. It is a huge range of activities of which this school hasn't been able to make use of them all. For our school, work around SSO, Google Apps, Library practice, social media spring to mind. An area of real interest for us is the joint wireless project on the Waimea Campus with the controlling software on the Loop - this opens up great possibilities for the school for wireless over our site.

Non NEN Trial

We are behind the eight ball due to the lack of school wide and class based technologies so staff can practise and experiment with what they have been exposed to at courses.

Much of this has been led/provided by staff themselves (lead teachers and staff undertaking PD though our VLN cluster) and a trusted local consultant. There has been high take-up and buy-in from staff into these PD sessions (which have occurred on several occasions).

Very collaborative cluster.

We have introduced a lot of innovations over the last 2 years and have been aware of the need to provide support for staff. Much of what school leaders have learned through cluster professional development has then been included in PD for staff.

Designed by us, for us.

Not all staff attend, not all staff are interested, not all staff have the access to the technology to allow them to implement the learning.

Integration into learning programmes has been excellent, especially with new Web2 tools.

Need more time and opportunities.

While staff have increasing desire to implement ICT, they do not have the confidence to do so and find insufficient time to dedicate to learning ICT applications, especially alongside the AS alignment work.

It worked.

Real confidence and ownership. Some significant shift happening.

We have invited experts to share knowledge with us and assist us in the development of our skills. These have been well received and usually take place at school after the students have left - we fit in with our environment.

Teachers are beginning to use digital technology more in classrooms and vary the type they are using.

There are more opportunities than we can adequately benefit from – it's a case of picking from what's available for what best suits your school.

APPENDIX SEVEN: SIGNIFICANCE TESTING

Table 23: Significance testing for changes over time in levels of satisfaction with ICT infrastructure

		N	x̄	sd	F	Sig.
Number of computers for student use	2011.00	49	2.80	1.500	.356	.552
	2012.00	53	2.96	1.315		
	Total	102	2.88	1.402		
Reliability of the network	2011.00	49	3.53	1.445	1.002	.319
	2012.00	53	3.81	1.388		
	Total	102	3.68	1.415		
Speed of the network	2011.00	49	3.61	1.288	1.619	.206
	2012.00	53	3.94	1.336		
	Total	102	3.78	1.317		
Ease of access to the Internet for students	2011.00	49	3.22	1.433	4.164	.044
	2012.00	53	3.79	1.378		
	Total	102	3.52	1.426		
Ease of access to computers for students	2011.00	49	2.92	1.367	1.150	.286
	2012.00	53	3.19	1.178		
	Total	102	3.06	1.273		
Ability of students to access and use different sites and resources using the Internet	2011.00	49	3.78	1.327	.498	.482
	2012.00	53	3.96	1.344		
	Total	102	3.87	1.333		
Opportunities to develop your capability in using digital technologies in the classroom	2011.00	49	3.63	1.253	2.156	.145
	2012.00	53	4.00	1.271		
	Total	102	3.82	1.270		
The technical support provided to ensure digital technologies work effectively.	2011.00	47	4.00	1.383	.977	.325
	2012.00	53	4.26	1.288		
	Total	100	4.14	1.333		
Access to a range of digital technologies to support teaching and learning	2011.00	49	4.00	1.339	1.684	.197
	2012.00	53	4.32	1.156		
	Total	102	4.17	1.251		
Access to a range of relevant content and services on the Internet to support student learning	2011.00	49	3.63	1.253	3.642	.059
	2012.00	53	4.08	1.089		
	Total	102	3.86	1.186		

Table 24: Significance testing for expected and reported levels of impact (teachers).

		N	x̄	sd	F	Sig.
The way students experience and participate in their learning	2011	53	4.15	1.116	11.489	.001
	2012	45	3.24	1.525		
	Total	98	3.73	1.389		
The involvement of parents and whānau in the learning of their children	2011	53	3.40	1.261	14.156	.000
	2012	46	2.43	1.276		
	Total	99	2.95	1.351		
Opportunities for you to undertake professional learning/development	2011	52	4.23	1.148	6.726	.011
	2012	45	3.51	1.576		
	Total	97	3.90	1.403		
The range of media through which your students can access information and knowledge to support their learning	2011	53	4.79	1.081	22.205	.000
	2012	46	3.57	1.500		
	Total	99	4.22	1.425		
The academic achievement of your students	2011	51	3.71	1.045	10.448	.002
	2012	46	2.91	1.363		
	Total	97	3.33	1.264		
Your workload with regard to professional activities such as preparing lesson plans, developing resources	2011	53	4.15	1.292	2.706	.103
	2012	46	3.67	1.592		
	Total	99	3.93	1.452		
Social outcomes for your students related to key competencies including participating and contributing, managing self, relating to others	2011	53	3.62	1.096	12.016	.001
	2012	46	2.78	1.315		
	Total	99	3.23	1.268		
Your students expertise in using digital technologies	2011	53	4.38	1.042	16.650	.000
	2012	46	3.33	1.506		
	Total	99	3.89	1.377		
Opportunities for your students to access external experts who can support them with their learning	2011	53	4.11	1.340	29.841	.000
	2012	46	2.59	1.439		
	Total	99	3.40	1.577		
The reliability and speed of your school's Internet	2011	53	4.94	1.183	15.239	.000
	2012	46	3.76	1.804		
	Total	99	4.39	1.609		
The engagement of your students in the teaching and learning activities in your class	2011	53	4.23	1.068	14.056	.000
	2012	46	3.24	1.537		
	Total	99	3.77	1.391		
Opportunities for you to collaborate with staff and students from other schools	2011	53	4.00	1.193	19.712	.000
	2012	46	2.80	1.485		
	Total	99	3.44	1.458		
The involvement of the wider community in school-wide activities	2011	53	3.53	1.170	22.032	.000
	2012	46	2.39	1.238		
	Total	99	3.00	1.325		
Your workload with regard to administrative tasks	2011	53	3.87	1.272	.024	.877
	2012	46	3.83	1.419		
	Total	99	3.85	1.335		
Opportunities for your students to collaborate with students from other schools in learning activities	2011	52	3.81	1.269	27.882	.000
	2012	45	2.40	1.355		

	Total	97	3.15	1.481		
Your ability to access educational resources relevant to meeting student need	2011	53	4.53	1.103	7.522	.007
	2012	46	3.80	1.515		
	Total	99	4.19	1.353		

Table 25: Significance testing for expected and reported levels of impact (principals)

Statistically significant differences are shown in bold. These were calculated using paired t-tests.

	Mean		N	s.d.	
	2011	2012	2011-12	2011	2012
Teaching and learning practices in the classroom	4.69	4.23	26	0.970	1.142
Student academic achievement	4.08	3.65	26	0.977	1.198
Social outcomes for students related to the key competencies (self-management, participation and contribution etc)	**4.12**	**3.38**	26	1.107	1.416
Student skills in using ICT (digital literacy)	**4.62**	**3.92**	26	1.100	1.495
Student engagement in classroom activities	**4.85**	**4.00**	26	0.925	1.575
The involvement of parents and whānau in the learning of their children	**4.04**	**3.08**	26	1.280	1.468
The involvement of the wider community in school-wide activities	**3.88**	**3.08**	25	1.053	1.441
The workload of teachers with regard to professional activities such as preparing lesson plans, developing resources	4.12	3.73	26	1.033	1.430
The workload of teachers with regard to administrative tasks such as reporting to parents, recording student assessment, taking the roll	3.96	3.44	25	1.338	1.417
The opportunity for staff to collaborate/interact with staff and students from other schools	**4.57**	**3.35**	23	1.441	1.402
The opportunity for students to collaborate/interact with students from other schools in learning activities	**4.31**	**2.77**	26	1.289	1.275
Professional learning opportunities for teachers	4.58	4.42	26	1.238	1.332
Efficiencies in completing administrative tasks within the school (accounting, roll returns etc)	4.15	3.77	26	1.377	1.478
Financial cost of operating the school	3.60	3.80	25	1.291	1.633
Effectiveness of the school ICT infrastructure	**5.16**	**4.36**	25	.850	1.500
Financial cost of providing for digital technologies/learning in the school	4.40	3.88	25	1.190	1.536

Table 26: Statistical testing for confidence and expertise 2011 and 2012

		N	$\bar{x}$	sd		
I am confident in my ability to use a range of digital technologies in my classroom to present material to my students	2011.00	**48**	**4.17**	**1.155**	**.977**	**.325**
	2012.00	**51**	**4.39**	**1.115**		
	Total	**99**	**4.28**	**1.134**		
I am confident in my ability to facilitate opportunities for my students to use a range of digital technologies in their learning experiences	2011.00	**49**	**3.96**	**1.241**	**.745**	**.390**
	2012.00	**52**	**4.17**	**1.248**		
	Total	**101**	**4.07**	**1.243**		
I am confident I am able to learn how to use new digital technologies and applications to support the learning of my students	2011.00	**49**	**4.51**	**1.175**	**.744**	**.390**
	2012.00	**52**	**4.69**	**.940**		
	Total	**101**	**4.60**	**1.059**		
I am confident in my ability to use digital technologies to plan and prepare a range of teaching and learning activities for my students	2011.00	**48**	**4.31**	**1.257**	**1.185**	**.279**
	2012.00	**51**	**4.57**	**1.082**		
	Total	**99**	**4.44**	**1.171**		

APPENDIX EIGHT: ELEARNING SCALE RESPONSES

Table 27: Mean levels of accuracy for each statement in the eLearning scale – all principal respondents

	$\bar{x}$	sd
Capability		
Our staff has access to the digital technologies they need for effective teaching and learning in a 21st century learning context	4.75	1.176
eLearning is an integral part of our school wide planning	4.17	1.404
Teachers have the necessary expertise (skills and knowledge) to integrate digital technologies into their classroom practices	4.17	1.018
Students have the necessary expertise to use digital technologies to enhance/enrich their learning experiences	4.39	0.893
Our students have access to the digital technologies they need to achieve to their potential in all areas of their schooling	4.15	1.255
The necessary technical support is available in our school to ensure reliable access to the Internet and other digital tools	4.69	1.133
Culture		
The leadership in our school actively supports teachers to take risks and try new things in order to promote student learning	5.10	0.994
The use of digital technologies is explicitly linked to our school wide vision for learning	4.58	1.108
Teachers are involved in professional learning/development related to the use of digital technologies in classroom practices	4.83	1.243
The teachers in our school continuously reflect on their current practice using evidence of student learning	4.88	0.841
The teachers in our school actively seek new ideas and practices through professional learning opportunities	4.67	0.883
Digital technologies are being used in classrooms to enhance/enrich student learning experiences and outcomes	4.48	1.031
Parents and whānau understand the importance of eLearning to achieving our school wide vision for student learning	3.81	1.003
The Board understands the importance of eLearning to achieving our school wide vision	4.83	0.834
Teachers understand the importance of eLearning to achieving our school wide vision for student learning	4.27	1.198
Collaboration		
Students utilise digital technologies to access external experts to support their learning	3.46	1.220
Parents and whānau have digital access to the work their children have completed or published (via wikis, blogs, e portfolios)	3.42	1.528
Parents and whānau have the opportunity to actively participate in their children's' learning through interactive digital tools	3.17	1.492
Our school works closely with the wider community and other organisations to ensure we are able to meet the needs of our students in a digital environment	3.63	1.404
Parents and whānau have digital access to records of learning for their children	2.46	1.529
Teachers collaborate with other schools and colleagues using digital technologies	3.50	1.414
Students utilise digital technologies to work collaboratively with students from other schools	2.52	1.238
Teachers in our school are guided by students on decisions about which digital technologies to adopt and how best to use them	2.83	1.277
COMPONENTS		
Culture	4.61	0.743
Capability	4.39	0.893
Collaboration	3.11	1.029

Table 28: Means and standard deviations for eLearning scale for matched sample of principals 2011/2012

	Mean			Std. Deviation	
	2011	2012	Diff.	2011	2012
Parents and whānau have digital access to records of learning for their children	2.00	2.35	0.35	1.291	1.561
Students utilise digital technologies to work collaboratively with students from other schools	2.23	2.48	0.25	1.175	1.313
Teachers in our school are guided by students on decisions about which digital technologies to adopt and how best to use them	2.68	2.68	0.00	1.166	1.275
Parents and whānau have the opportunity to actively participate in their children's' learning through interactive digital tools	2.77	3.13	0.36	1.251	1.456
Parents and whānau have digital access to the work their children have completed or published (via wikis, blogs, e portfolios)	3.13	3.45	0.32	1.669	1.588
Students utilise digital technologies to access external experts to support their learning	3.26	3.52	0.26	1.182	1.235
Teachers collaborate with other schools and colleagues using digital technologies	3.39	3.68	0.29	1.430	1.423
Our school works closely with the wider community and other organisations to ensure we are able to meet the needs of our students in a digital environment	3.43	3.47	0.04	1.431	1.548
Parents and whānau understand the importance of eLearning to achieving our school wide vision for student learning	3.61	3.87	0.26	1.086	1.056
eLearning is an integral part of our school wide planning	4.13	4.23	0.10	1.310	1.309
Teachers have the necessary expertise (skills and knowledge) to integrate digital technologies into their classroom practices	4.13	4.29	0.16	0.846	1.006
Our students have access to the digital technologies they need to achieve to their potential in all areas of their schooling	4.13	4.19	0.06	1.147	1.195
Students have the necessary expertise to use digital technologies to enhance/enrich their learning experiences	4.35	4.48	0.13	0.950	0.890
The necessary technical support is available in our school to ensure reliable access to the Internet and other digital tools	4.37	4.50	0.13	1.402	1.253
Digital technologies are being used in classrooms to enhance/enrich student learning experiences and outcomes	4.39	4.65	0.26	1.116	1.050
Teachers understand the importance of eLearning to achieving our school wide vision for student learning	4.39	4.55	0.16	1.145	1.059
The use of digital technologies is explicitly linked to our school wide vision for learning	4.45	4.71	0.26	1.261	0.902
The teachers in our school actively seek new ideas and practices through professional learning opportunities	4.58	4.84	0.26	0.958	0.934
Teachers are involved in professional learning/development related to the use of digital technologies in classroom practices	4.63	5.00	0.37	1.273	1.114
Our staff has access to the digital technologies they need for effective teaching and learning in a 21st century learning context	4.65	4.87	0.22	1.050	0.957
The Board understands the importance of eLearning to achieving our school wide vision	4.65	4.87	0.22	1.142	0.885
The teachers in our school continuously reflect on their current practice using evidence of student learning	4.71	4.97	0.26	1.101	0.836
The leadership in our school actively supports teachers to take risks and try new things in order to promote student learning	5.23	5.23	0.00	0.956	0.845

Table 29: Statistical significance testing for matched sample of principals - eLearning scale.

Factor	Culture	Capability	Collaboration
Time	F(1,30) = 2.78, p = .11	F(1,30) = 1.07, p = .31	F(1,30) = 1.89, p = .18
Time by loop	F(3,25) = .55, p = .66	F(3,25) = .88, p = .47	F(3,25) = 1.24, p = .32
Loop	F(3,25) = 1.57, p = .22	F(3,25) = .70, p = .56	F(3,25) = 1.14, p = .52

APPENDIX NINE: THE USE OF DIGITAL TECHNOLOGIES IN TEACHING AND LEARNING

Table 30: Mean levels of accuracy for teaching and learning scale 2012 - All teacher respondents

	$\bar{x}$	sd
Create		
I access information and resources from the Internet (e.g. document files, images, web pages) to develop lesson plans and create resources for my students	5.35	1.004
I access multimedia resources and activities through the Internet (e.g. video clips, digital learning objects, educational games-based activities) to develop lesson plans and create resources for my students	5.19	1.071
I create artefacts using a computer (e.g. word documents, spreadsheets, presentations, videos).	5.40	1.020
I share artefacts, such as lesson plans or student resource material, with colleagues utilizing the Internet(e.g. blogs, ePortfolios, uploading video clips and other artefacts)	4.43	1.420
My students access information and resources from the Internet (e.g. document files, images, web pages)	4.89	1.213
My students access multimedia resources and activities through the Internet (e.g. video clips, digital learning objects, educational games-based activities)	4.74	1.285
My students create artefacts using a computer (e.g. word documents, spreadsheets, presentations, videos).	4.70	1.333
Collaborate		
I create artefacts in a collaborative/interactive online environment with colleagues using co-authoring, collaborative applications e.g. Google docs, Voice Thread, wikispaces	3.58	1.459
I interact with others in the wider education community through video conferencing or Skype (simulating face-face communication)	2.94	1.386
My students share artefacts with the wider community utilizing the Internet(e.g. blogs, ePortfolios, uploading video clips and other artefacts)	3.47	1.406
My students create artefacts in a collaborative/interactive online environment with family, whānau, other students using co-authoring, collaborative applications e.g. Google docs, Voice Thread, wikispaces	3.02	1.284
My students interact with others in the wider community such as experts and other students through tools such as video conferencing or Skype (simulating face-face communication)	2.70	1.216
My students interact with others in a virtual community or world using gaming and/or social networking applications including virtual field trips and online interactive games	2.95	1.427
COMPONENTS		
Create	4.96	0.861
Collaborate	3.12	1.043

Table 31: Comparison of means for matched sample of teachers 2011/2012

	2011 x̄	2012 x̄	Diff	2011 sd	2012 sd
Create					
I create artefacts using a computer (e.g. word documents, spreadsheets, presentations, videos)	5.41	5.25	-0.16	0.89	.1.24
I access information and resources from the Internet (e.g. document files, images, web pages) to develop lesson plans and create resources for my students	5.20	5.27	0.07	1.17	1.07
My students access information and resources from the Internet (e.g. document files, images, web pages)	4.90	4.67	-0.23	1.10	1.41
I access multimedia resources and activities through the Internet (e.g. video clips, digital learning objects, educational games-based activities) to develop lesson plans and create resources for my students	4.86	5.19	0.33	1.31	1.12
My students create artefacts using a computer (e.g. word documents, spreadsheets, presentations, videos)	4.49	4.46	-0.03	1.27	1.60
My students access multimedia resources and activities through the Internet (e.g. video clips, digital learning objects, educational games-based activities)	4.60	4.60	0.00	1.23	1.47
I share artefacts, such as lesson plans or student resource material, with colleagues utilising the Internet (e.g. blogs, e portfolios, uploading video clips and other artefacts)	3.92	4.25	0.33	1.65	1.52
Collaborate					
My students share artefacts with the wider community utilising the Internet (e.g. blogs, e portfolios, uploading video clips and other artefacts)	2.98	3.33	0.35	1.32	1.37
I create artefacts in a collaborative/interactive online environment with colleagues using co-authoring, collaborative applications (e.g. Google docs, voice thread, wiki spaces)	2.88	3.5	0.62	1.20	1.45
My students create artefacts in a collaborative/interactive online environment with family, whānau, other students using co-authoring, collaborative applications (e.g. Google docs, voice thread, wikispaces)	2.43	2.73	0.30	0.91	1.15
My students interact with others in a virtual community or world using gaming and/or social networking applications including virtual field trips and online interactive games.	2.40	2.50	0.10	0.99	1.11
I interact with others in the wider educational community through video conferencing or Skype (simulating face-face communication)	2.48	2.62	0.14	1.05	1.19
My students interact with others in the wider community such as experts and other students through tools such as video conferencing or Skype (simulating face-face communication)	2.62	2.85	0.23	1.31	1.46
COMPONENTS					
Create	4.76	4.84	0.08	0.93	1.01
Collaborate	2.60	2.95	0.35	0.85	0.93

Table 32: Significance of shifts by component for teaching and learning

	F-value of shift	p-value
Create	0.173	.679
Collaborate	3.42	.068

APPENDIX TEN: STUDENT OUTCOMES SCALE

Table 33: Mean levels of reported use 2012 - all respondents

	$\bar{x}$	SD
Participate in independent learning through access to education at time and pace of their own choosing	3.52	1.114
Increase motivation for curriculum tasks	3.84	1.149
Develop core competencies in a specified content area	3.65	1.147
Actively construct knowledge that integrates curriculum areas	3.61	1.166
Actively construct their own knowledge in collaboration with their peers and others	3.64	1.204
Synthesise their knowledge	3.57	1.262
Demonstrate what they have learned	3.87	1.157
Gain cultural awareness	3.02	1.241
Acquire the knowledge, skills, abilities and attitudes to deal with ongoing technological change	3.86	1.265
Integrate different media to create appropriate products	3.55	1.334
Acquire awareness of the global implications of ICT-based technology on society	3.07	1.324
Develop deep understanding about a topic of interest relevant to the curriculum area(s) being studied	3.91	1.193
Support elements of the learning process	4.10	1.136
Communicate with others locally and globally	3.23	1.456
Develop a scientific understanding of the world	3.00	1.288
Understand and participate in the changing knowledge economy	2.93	1.254
Plan and/or manage curriculum projects	3.54	1.358
Engage in sustained involvement with curriculum activities	3.57	1.268
Critically evaluate their own and society's values	2.85	1.271
Undertake formative and/or summative assessment	3.60	1.379
Transform component	**3.08**	**1.022**
Enhance component	**3.64**	**0.981**

Table 34: Comparison of mean levels of use by item for each component as reported by the 2011/2012 matched sample of teachers.

	2011 Current x̄ (SD)	2011 Preferred x̄ (SD)	2012 Current x̄ (SD)
Transform			
Understand and participate in the changing knowledge economy	2.15 (0.89)	3.98 (1.39)	2.77 (1.2)
Communicate with others locally and globally	2.27 (1.04)	4.23 (1.42)	3.06 (1.31)
Critically evaluate their own and society's values	2.41 (1.07)	3.82 (1.61)	2.49 (1.14)
Acquire awareness of the global implications of ICT-based technologies on society	2.17 (1.07)	3.74 (1.6)	2.89 (1.14)
Gain cultural awareness	2.46 (1.05)	4.11 (1.4)	2.87 (1.33)
Participate in independent learning through access to education at a time and pace of their own choosing	3.1 (1.08)	4.67 (.93)	3.38 (1.02)
Enhance			
Develop a scientific understanding of the world	2.74 (1.2)	4.04 (1.55)	2.94 (1.22)
Plan and/or manage curriculum projects	2.81 (1.21)	4.33 (1.37)	3.38 (1.27)
Undertake formative and/or summative assessment	2.91 (1.4)	4.41 (1.15)	3.4 (1.31)
Integrate different media to create appropriate products	2.46 (.99)	4.19 (1.31)	3.36 (1.26)
Engage in sustained involvement with curriculum activities	3.0 (1.12)	4.5 (1.17)	3.38 (1.18)
Synthesise their knowledge (pulling the pieces of knowledge together)	2.87 (1.12)	4.63 (1.2)	3.43 (1.2)
Actively construct knowledge that integrates curriculum areas	2.96 (1.16)	4.43 (1.04)	3.68 (.96)
Develop core competencies in a specified content area	2.98 (1.1)	4.49 (1.04)	3.47 (1.1)
Actively construct their own knowledge in collaboration with their peers and others	2.87 (1.17)	4.38 (1.31)	3.45 (1.23)
Acquire the knowledge, skills, abilities and attitudes to deal with on-going technological change	2.83 (1.12)	4.79 (1.14)	3.81 (1.19)
Develop deep understanding about a topic of interest relevant to the curriculum area(s) being studied	3.13 (1.16)	4.89 (1.24)	3.81 (1.08)
Demonstrate what they have learned	3.17 (1.08)	4.83 (1.09)	3.74 (1.11)
Support elements of the learning process	3.21 (.97)	4.79 (.93)	3.96 (1.0)
Increase motivation for curriculum tasks	3.38 (1.2)	4.83 (1.03)	3.98 (.99)
Transform Overall	**2.4 (0.78)**	**4.07 (1.09)**	**2.91 (0.91)**
Enhance Overall	**2.94 (.93)**	**4.53 (.88)**	**3.56 (.89)**

Table 35: Statistically significant differences for Transform component 2011/2012 matched sample.

		Sum of Squares	df	Mean Square	F	Sig.
Independent learning Current	Between Groups	1.880	1	1.880	1.708	.194
	Within Groups	108.932	99	1.100		
	Total	110.812	100			
Independent learning Preferred	Between Groups	41.871	1	41.871	43.579	.000
	Within Groups	95.119	99	.961		
	Total	136.990	100			
Cultural awareness Current	Between Groups	4.226	1	4.226	2.905	.091
	Within Groups	143.992	99	1.454		
	Total	148.218	100			
Cultural awareness Preferred	Between Groups	38.206	1	38.206	20.511	.000
	Within Groups	182.544	98	1.863		
	Total	220.750	99			
Global implications of ICT Current	Between Groups	12.791	1	12.791	10.450	.002
	Within Groups	119.959	98	1.224		
	Total	132.750	99			
Global implications of ICT Preferred	Between Groups	17.890	1	17.890	9.525	.003
	Within Groups	182.190	97	1.878		
	Total	200.081	98			
Communicate locally and globally Current	Between Groups	15.552	1	15.552	10.973	.001
	Within Groups	140.309	99	1.417		
	Total	155.861	100			
Communicate locally and globally Preferred	Between Groups	34.534	1	34.534	18.672	.000
	Within Groups	181.256	98	1.850		
	Total	215.790	99			
Participate in changing knowledge economy Current	Between Groups	9.509	1	9.509	8.294	.005
	Within Groups	111.218	97	1.147		
	Total	120.727	98			
Participate in changing knowledge economy Preferred	Between Groups	35.290	1	35.290	21.140	.000
	Within Groups	160.261	96	1.669		
	Total	195.551	97			
Critically evaluate own and society's values Current	Between Groups	.148	1	.148	.121	.728
	Within Groups	118.397	97	1.221		
	Total	118.545	98			
Critically evaluate own and society's values Preferred	Between Groups	43.157	1	43.157	22.786	.000
	Within Groups	181.823	96	1.894		
	Total	224.980	97			

Table 36: Statistically significant differences for Enhance component 2011/2012 matched sample

		Sum of Squares	df	Mean Square	F	Sig.
Increase motivation for curriculum tasks Current	Between Groups	9.254	1	9.254	7.749	.006
	Within Groups	118.231	99	1.194		
	Total	127.485	100			
Increase motivation for curriculum tasks Preferred	Between Groups	18.293	1	18.293	17.816	.000
	Within Groups	101.648	99	1.027		
	Total	119.941	100			
Develop core competencies Current	Between Groups	6.110	1	6.110	5.033	.027
	Within Groups	120.187	99	1.214		
	Total	126.297	100			
Develop core competencies Preferred	Between Groups	25.798	1	25.798	22.383	.000
	Within Groups	112.952	98	1.153		
	Total	138.750	99			
Actively construct knowledge - integrate Current	Between Groups	12.978	1	12.978	11.619	.001
	Within Groups	109.462	98	1.117		
	Total	122.440	99			
Actively construct knowledge - integrate Preferred	Between Groups	13.873	1	13.873	14.011	.000
	Within Groups	97.037	98	.990		
	Total	110.910	99			
Actively construct own knowledge – collaborate Current	Between Groups	8.394	1	8.394	5.778	.018
	Within Groups	142.366	98	1.453		
	Total	150.760	99			
Actively construct own knowledge – collaborate Preferred	Between Groups	21.552	1	21.552	13.347	.000
	Within Groups	158.238	98	1.615		
	Total	179.790	99			
Synthesise their knowledge Current	Between Groups	7.857	1	7.857	5.822	.018
	Within Groups	132.253	98	1.350		
	Total	140.110	99			
Synthesise their knowledge Preferred	Between Groups	35.254	1	35.254	24.472	.000
	Within Groups	139.736	97	1.441		
	Total	174.990	98			
Demonstrate what they have learned Current	Between Groups	8.160	1	8.160	6.790	.011
	Within Groups	118.969	99	1.202		
	Total	127.129	100			
Demonstrate what they have learned Preferred	Between Groups	29.810	1	29.810	24.562	.000
	Within Groups	118.940	98	1.214		
	Total	148.750	99			

Ongoing technological change Current	Between Groups	24.091	1	24.091	17.962	.000
	Within Groups	132.780	99	1.341		
	Total	156.871	100			
Ongoing technological change Preferred	Between Groups	23.724	1	23.724	17.353	.000
	Within Groups	133.986	98	1.367		
	Total	157.710	99			
Integrate different media Current	Between Groups	20.410	1	20.410	15.772	.000
	Within Groups	128.105	99	1.294		
	Total	148.515	100			
Integrate different media Preferred	Between Groups	17.285	1	17.285	10.491	.002
	Within Groups	161.465	98	1.648		
	Total	178.750	99			
Develop deep understanding Current	Between Groups	11.865	1	11.865	9.521	.003
	Within Groups	123.363	99	1.246		
	Total	135.228	100			
Develop deep understanding Preferred	Between Groups	29.179	1	29.179	21.898	.000
	Within Groups	130.581	98	1.332		
	Total	159.760	99			
Support elements of learning process Current	Between Groups	14.317	1	14.317	14.789	.000
	Within Groups	95.841	99	.968		
	Total	110.158	100			
Support elements of learning process Preferred	Between Groups	16.953	1	16.953	18.099	.000
	Within Groups	91.797	98	.937		
	Total	108.750	99			
Develop scientific understanding Current	Between Groups	1.028	1	1.028	.703	.404
	Within Groups	141.700	97	1.461		
	Total	142.727	98			
Develop scientific understanding Preferred	Between Groups	29.504	1	29.504	15.499	.000
	Within Groups	182.741	96	1.904		
	Total	212.245	97			
Plan and/or manage curriculum projects Current	Between Groups	8.061	1	8.061	5.206	.025
	Within Groups	151.729	98	1.548		
	Total	159.790	99			
Plan and/or manage curriculum projects Preferred	Between Groups	22.166	1	22.166	12.755	.001
	Within Groups	168.562	97	1.738		
	Total	190.727	98			
Sustained involvement with curriculum activities Current	Between Groups	3.547	1	3.547	2.665	.106
	Within Groups	130.453	98	1.331		
	Total	134.000	99			

Sustained involvement with curriculum activities Preferred	Between Groups	31.037	1	31.037	22.475	.000
	Within Groups	133.953	97	1.381		
	Total	164.990	98			
Undertake assessment Current	Between Groups	5.771	1	5.771	3.171	.078
	Within Groups	178.339	98	1.820		
	Total	184.110	99			
Undertake assessment Preferred	Between Groups	25.462	1	25.462	16.707	.000
	Within Groups	147.831	97	1.524		
	Total	173.293	98			

APPENDIX ELEVEN: GENERAL COMMENTS

Principals

School progress is not always dependent on Internet access and school network upgrading. Sometimes there needs to be a willingness to extend and provide digital equipment, tools and software to all areas of the school and in a quantity that allows and embeds change.

Three things irk me as they quickly become barriers to others engaging: How to avoid "technical train-spotting"; how to avoid people rushing off to the "next big thing"; and how to avoid "brand name-blindness". The combination of all three of these should be a diagnosable medical condition that renders you unreliable in the advising or development of others. I am well aware that we are only part-way into a Digital Revolution. That is likely to change society, including lifestyle, work, and learning more so than any of the similar 'revolutions' from the past (e.g. Industrial Revolution). Knowing also that we don't know how this will end nor how it will get there is also OK. We just need to factor continuous change and 'un-learning' into our thinking and approach. I believe it is important that we equip our Teachers and Students, and those advising/training them with a wider view. So we can scaffold their learning experience to one of continuous change and development - and that's OK. Essentially, an understanding of: (example) ... "We know people learn and work better in groups. Especially when they feel confident and safe enough to share their ideas and questions. This 'software/tool/device' is one way we can currently support our learners to do this. There will a newer version or an even better way soon enough. But in the meantime here's how we can do this ...and how others have used it, ...and the effects that it has had..." Most importantly we need to give our people the confidence to fail. To give something a go; have it crash on them; recover the moment and the learning; reflect on it a bit; and then at an appropriate time give it another go. The full potential of the NEN Trial won't be realised until we learn that this is about equipping people with perspectives, as well as skills, and the confidence to fail. And through this nurture the flair to play in the future.

UFB and SNUP upgrade has made an unbelievable difference to teaching and learning with amazing resources at our fingertips. Thank you.

The NEN has been great with access to so many things we use - Google apps and YouTube especially - please retain this in the new Learning Network.

A barrier for us in a rural school has been the collaboration with parents who do not have the same accessibility to the internet as we do. Many of our families do not have the technology available in

their homes for child use. (Farming computer used for business only.) We do make our resources available to them, but we are dealing with a generation that is not as engaged as our younger generation. Questions asked about the services and content on KAREN were met with a limited response. We were not supported in this area at all, meaning we were not fully utilizing it. Further work done here would have been of benefit.

We have used what we could but felt there was probably heaps more we could do but do not access it because we didn't know how and didn't push hard enough to find out.

More communication about the NEN trial program.

33% of Yr7 new entrants to QCC have no Internet facility at home. Collaboration with the local library assists but... QCC 33% Maori.

The best benefit for us has been the opportunity to have fast and consistent access to the internet via fibre optic cabling. The second best benefit has been the high quality teacher professional development at no cost at an after school time slot that is a good time length, easy to get to and easy to partake in. It is appreciated that all who wish to attend workshops can - there are no limits on numbers.

Always feel on the outer when we have SO much good will, time and expertise to share

We appreciate the opportunities we have had on the NEN trial and know that we are further along the pathway than we would have been without the trial. We are also very aware that we have a long way to go - we have not started the work with our parents involvement in technologies yet - and will welcome any support we can get in this area

As a school we have not had a specific team that worked on the NEN trial team and not many opportunities for PD have been forwarded to staff. Staff had other issues due to the circumstances of our school operating on two sites. We did loads of in-house PD.

Teachers

Because I am the eDean I have twenty five students using the technologies all the time and relying on them completely for their learning- my survey results reflect this. I have been fortunate to have had a lot of PD in this area over the last 2 1/2 years and I am now organising whole staff PD in this area. Right now our school does not have enough computers and teachers are hampered by that- but we have just got wireless and we are looking at BYOD- at which point many more teachers are likely to be able to make the most of the learning opportunities provided by the technologies.

Having come from overseas NZ still far behind in availability of technology and its use in the classroom.

I didn't even know what the NET, KAREN things were. We have had a network upgrade but had never heard it called these things before.

Actually I had no idea we, our school, was in this trail. Last year we had quite a bit of growth and development re digital technologies but this year nothing

It was difficult to answer many of these questions accurately because of the differential in access to computers for students compared to my last school. In my last school I had ten well equipped computers in my room so was able to use blogs, wikis etc very efficiently. Whereas, in my current school, the computer labs are much more difficult to access regularly - we have a weeks block booking per term, so just four hours a term - so I am unable to use technology to the extent I would want to in my teaching. However, we have a laptop 'cow' of thirty computers that will ease this slightly, coming into circulation within the next six months. While an improvement, this is still very

marginal in terms of access for students because of the ratio of students to computers overall. If my students had greater access to equipment I would be using computers far more creatively - as I did in my last school. In the current context the short time overall reduces the use to purely word processing.

What is the NEN trial?

Our access to what is available out there has increased markedly. Unfortunately the time it takes to source and view appropriateness of materials and set up of equipment has become a much bigger job. You win some and you lose some!

I need help to use NEN Karen properly. I will find out about some PD to achieve better in all areas of it. Thank you.

Ultrafast broadband in the school has not really materialised. We do not have enough computers and the school infrastructure in term of computers available and ease of set up is not conducive to leveraging any access we may have. Nothing has changed.

Disappointment is regular when we set up live streams etc and they time out or crash due to unreliable connectivity or slow data speed.

The success of the ICT training/PD is hindered by: the time constraints/the one to teach many approach/and the frequency of training to embed newly learnt skills. It must be also very difficult for Leaders of PD as the level of skill/knowledge in a class is huge and the time frame to get through so much is very limited.

We only have 1 computer room with Microsoft or opposite of Mac and 2 rooms with Macs but very limited access and 6 in library. My dept has a COW that my lower level student aren't allowed access to and there is only like 8 of them. It's getting better re data projects in most classes but really difficult to book the Micro computer room. Thanks

Impact on my students was greatly reduced due to the lack of available computers.

Access to computers for staff and students is the problem, whether it is hardware or internet access.

Hard to tell the difference that NEN has made because can't compare with or without.

Due to the subject I teach I have not been part of the school where I believe this has been trialled so my feedback may not be that helpful. I am excited by the prospects of this flowing into my subject area and the opportunities it will create and the possible ways it could make my life easier. I do believe we need to progress with PD in this are as the kids are way ahead and I feel like I am slipping further behind. This I find sad when technology once learnt can make our lives so much easier in a job that is becoming more complex.

Don't know much about the NEN - but we don't have school buildings since the earthquake.

Much of the change in my teaching practice has been in using the collaborative web 2 Tools. We had access to these and good internet access anyway, being connected to KAREN has made little difference in the day to day life of my job or the students I teach learning. I am a DPrincipal, and teach a Year 13 Digital Technology class, so some of the answers are a little skewed!

I think it's hard to measure the impact of the NEN trial in that I can't remember what it was like before we had ultra-fast broadband. It may have more of an impact than I realise!

I would like more time and opportunities to research and get acquainted with a wider range of web.2 tools. This would enhance my teaching and the students' learning but there is simply very little time and no courses available. This theme should be a school wide PD theme for another year. Last year there was too much pressure and requirements for other PD a well.