

# Future-focused learning in connected communities

MAY 2014

# Table of contents

<b>Foreword</b> .....	<b>2</b>
<b>21st Century Learning Reference Group members</b> .....	<b>3</b>
<b>Executive summary</b> .....	<b>4</b>
<b>The imperative for change</b> .....	<b>6</b>
<b>Priorities and recommendations to create confident, connected, lifelong learners</b> .....	<b>9</b>
1 Commit to meeting the needs of 21 <sup>st</sup> century learners .....	9
2 Achieve equitable access to digital devices for every learner .....	11
3 Invest in people and innovation.....	13
4 Create future-focused learning environments.....	16
5 Invest in high-quality digital content and systems to make content easily accessible .....	20
6 Build regional capability through collaboration .....	22
7 Build a robust evidence base .....	24
8 Implement a coordinated system-wide effort to align curriculum, digital technologies, property, infrastructure, funding, and legislation .....	26
9 Design a coherent, flexible and robust funding structure .....	28
10 Implement a comprehensive five-year plan from 2014 .....	29
<b>Summary of strategic priorities and recommendations</b> .....	<b>30</b>
<b>References</b> .....	<b>32</b>
<b>Appendix One: Defining digital competency</b> .....	<b>33</b>
<b>Appendix Two: Digital pedagogy</b> .....	<b>34</b>

# Foreword

As New Zealanders, we are rightly proud of our education system. We are recognised globally for the quality of our teaching, our concern for students, and our innovation. However, the emergence of ubiquitous connectivity, increasingly mobile digital technologies, and the power of the internet pose the most profound challenges and opportunities the education system has ever faced.

A strategy for learning with digital technologies is critically important for New Zealand's future economic and social prosperity. Our young people need to be digitally competent, so they can participate successfully in a modern economy and society, support their families, and contribute to the wider community. Whether our children aspire to be software developers for America's Cup yachts, dairy farmers, motor mechanics or fashion designers, digital competencies are now a universal requirement.

From early childhood education through to finishing compulsory schooling, this strategy needs to address the needs of all students, regardless of their circumstances. We must ensure equitable access to digital technologies. If we don't, the growing digital divide will have serious negative consequences.

The digital environment is already empowering learners and teachers as never before. We now need to ensure that all young learners have access to devices, networks, modern learning environments and future-focused teaching.

Our title for the report — *Future-Focused Learning in Connected Communities* — reflects evidence that collaborating in regional networks in partnership with our communities produces better outcomes for students. We must achieve better outcomes for all learners in all our communities.

The Reference Group has carefully considered the recommendations of the 2012 Education and Science Select Committee inquiry into 21<sup>st</sup> century learning environments and digital literacy. We agree that achieving coordinated, system-wide change is crucial. We must act decisively, act as a whole system, and start now.

We already have key elements in place. We have a very strong education system and a determination to meet the needs of all learners. Many leaders and teachers recognise the need for change. We have innovative initiatives showing the way. We have strong engagement from businesses, charities and other stakeholders; all interested in directly contributing to the development of future-focused learning.

This makes us very confident that, if we work in a coherent and open way, we can inspire our schools and their communities, and together seize this opportunity for all our young learners.

*Naku te rourou nau te rourou ka ora ai te iwi.*

*With your basket and my basket the people will live.*

**Brett O'Riley, Chair**

# 21<sup>st</sup> Century Learning Reference Group

## Members

Claire Amos  
Tim Copeland  
Sylvia Fidow  
David Langford  
Charles Newton  
Robin Ohia  
Brett O'Riley, Chair  
Kate Shevland  
Sue Sutherland  
Dr Allan Sylvester  
Allan Vester  
Derek Wenmoth  
Lynette Wray  
Laurence Zwimpfer

# Executive summary

## The vision is confident, connected, lifelong learners

Education is the powerhouse of modern societies. To prosper, grow and innovate, New Zealand needs highly-skilled people — people with increasingly sophisticated skills and digital competencies.

### A vision for future-focused learning in connected communities

Every young New Zealander is a confident, connected, lifelong learner equipped to live a full and active life, and contribute to a thriving and prosperous economy.

## Digital technologies support 21<sup>st</sup> century learning

The focus of this report is on transforming teaching and learning, enabled by technologies that are now widespread in our society. Digital technologies play an increasingly critical role in shaping and supporting an effective 21<sup>st</sup> century curriculum.

Digital technologies change the way students learn, the way teachers teach, and where and when learning takes place. Increasingly, mobile devices equip students to take charge of their own learning in a context where learning occurs anywhere, anytime, and with access to a wealth of content and interactive tools. Digital technologies can excite and engage educators, students, their whānau and communities in learning.

## Learners need equitable access to digital opportunities

We expect all learners to have an equitable opportunity to achieve education success. We expect education to equip them to:

- live harmoniously in an increasingly diverse society
- contribute to solving today's complex social, economic and environmental problems
- pursue activities that promote their health and well-being.

## We suggest ten strategic priorities for 21<sup>st</sup> century skills and digital competencies

Equipping learners with 21<sup>st</sup> century skills and digital competencies will require a significant programme of change in education. This report suggests ten strategic priorities for this programme, and makes 23 recommendations to Government.

### 1 Commit to meeting the needs of 21<sup>st</sup> century learners

Prepare learners with the knowledge, skills and digital competencies to actively participate in New Zealand's rapidly changing 21<sup>st</sup> century economy and society.

### 2 Achieve equitable access to digital devices for every learner

Ensure all learners have access to suitable digital technologies, regardless of location, background, abilities or socio-economic status.

### **3 Invest in people and innovation**

Build digital learning capability across the education system. Foster innovative teaching and leadership. Support leaders to manage change and stimulate innovation. Establish an Education Innovation Hub to nurture new and emerging approaches to teaching and learning.

### **4 Create future-focused learning environments**

Design vibrant, technology-rich, cyber-safe learning environments. Make these environments flexible enough to serve multiple learning contexts, including one-to-one, small groups, collaborative and community learning. Put learning at the heart of the system.

### **5 Invest in high-quality digital content and systems to make content easily accessible**

Design systems and policies that make it easy for students and educators to access online content, create and share knowledge, and collaborate across local and global networks of educators and learners.

### **6 Build regional capability through collaboration**

Invest in regional networks of educators to create, foster and spread innovative practice. These networks could also include tertiary providers, local government, communities and business.

### **7 Build a robust evidence base**

Establish an ongoing programme of research and evaluation to promote innovation and improvement across the whole education sector. Include exemplars of effective teaching and learning with digital technologies.

### **8 Implement a coordinated, system-wide effort to align curriculum, digital technologies, property, infrastructure, funding and legislation**

Integrate the core elements of digital learning with a relentless focus on promoting learning in safe, future-focused environments. Integrate curriculum, effective teaching and leadership practices, technologies, property and system infrastructure.

### **9 Design a coherent, flexible and robust funding structure to support 21<sup>st</sup> century learning**

Support with effective funding the new approaches to teaching and learning made possible by digital technologies. Align initiatives, reprioritise existing resources, establish public-private partnerships and create flexibility in funding policies.

### **10 Implement a comprehensive five-year plan from 2014**

Work with educators, education agencies and community leaders on an implementation plan for learning with digital technologies, with agreed goals and progress measures. Use the expertise that exists nationally and internationally to assist with implementation planning, oversight and evaluation.

# The imperative for change

This report proposes ten strategic priorities and 23 high-level recommendations to form the basis of a concerted plan of action across the education system from 2014. The report is presented with the assumption that strong leadership and effective pedagogical practices are at the heart of successful education systems. The recommendations aim to create the conditions in early childhood education services (ECE), schools and their communities in which innovative approaches to teaching and learning can thrive.

An important aspect of this report is maximising the potential for new and emerging technologies to change learning and teaching in the 21<sup>st</sup> century learning environment. We recognise that technologies are not an end in themselves. There is a growing body of evidence that the thoughtful integration of digital technologies with effective teaching practices can significantly improve learning outcomes (Greaves et al., 2010). Poorly-implemented digital technologies make little difference to educational achievement (ASCD Educational Leadership website, Feb 2011).

## Building a prosperous economy

The pervasive digital environment is fundamentally changing the way our economy and society function. New Zealand's prosperity depends on our ability to compete in a flattened, global economy driven by innovation, specialisation and entrepreneurship. Citizens need increasingly sophisticated skills and digital competencies to effectively participate in shaping a healthy society and economy.

Differences in education and skills between countries explain the difference in rates of economic growth more than any other single factor (MBIE Business Growth Agenda, 2012). New Zealand has performed well historically, but our ability to stay competitive depends on our education system equipping learners with the increasingly sophisticated skills required by their future employers.<sup>1</sup> The recommendations in this report focus on the skills, systems and supporting infrastructure needed for future-focused learning to respond to our rapidly-changing society and demanding economic environment.

## Addressing the challenges of the 21<sup>st</sup> century

In modern societies, new and emerging technologies power the skills that drive knowledge creation: complex problem-solving, innovation, communication and collaboration. Twenty-first century skills go hand-in-hand with technological advances. This report reflects the critical role of digital competencies in 21<sup>st</sup> century skills.

Despite the best efforts of educators and those who support them, our system struggles to meet the challenging needs of today's learners. We need to cope with complex lives, and social, economic and

---

<sup>1</sup> A Statistics New Zealand 2011 survey of innovation in New Zealand identified a lack of appropriately skilled and experienced personnel as a significant barrier hindering innovation.

environmental issues. Now, more than ever, the education system must equip young people to be the problem-solvers of the future.

Today's students need to be innovators, designers and creators — not just passive consumers. This means building competence in computer sciences, information management and ICT, as well as using digital technologies for learning across the curriculum.

Digital pedagogy is based on three key concepts: ubiquity, agency, and connectedness. Ubiquity refers to the pervasiveness of digital technologies. Agency refers to the power or capacity to act and make choices. Connectedness is about having a sense of being part of something that is bigger than one's self. A more detailed discussion of these key concepts is provided in Appendix Two.

## **Achieving equitable outcomes for all**

This report reflects the Government's stated educational priorities. The Government requires an education system that lifts achievement and prepares young people to meet the opportunities and challenges of the future. The report recommends strategies to help ensure all learners have equitable access to digital technologies, and most critically, to the effective teaching needed to make best educational use of those technologies.

Doing nothing is not an option. Inaction will only increase inequity and compound the difficulties for learners who are already doing less well. A further digital divide will exacerbate an already serious achievement gap.

Today, there are new challenges in ensuring that all students have equitable access to modern learning tools. New Zealand needs a concerted effort to ensure equitable outcomes for all young people, to improve their life chances and help break the cycle of poverty and underachievement that affects a significant proportion of the population.

While our focus is on schools and schooling, we recognise that early childhood services also prepare children for life in a complex, rapidly-changing digital world. Ensuring equitable access applies to children in early childhood services as much as to students at school. The high level of involvement of parents and whānau in early childhood services provides ideal opportunities to establish the effective use of digital technologies for learning right from the start. We recommend that the Government considers measures to help ensure early childhood services are appropriately equipped to meet that challenge.

We anticipate that, by 2017, when all New Zealand schools have access to Government funded high-speed internet connections, all children and young people will use personal digital devices for their learning. Some families struggle to afford and support digital devices and internet connections in their homes. This report recommends options for ensuring they do not miss out.

## **Developing thinking skills and acquiring knowledge**

This report considers digital competencies. Such a focus does not imply that knowledge no longer matters, or that the school curriculum does not need to establish explicit goals for students' knowledge development. In the 21<sup>st</sup> century, citizens need to be able to apply knowledge to solve



complex problems, often in cross-disciplinary and collaborative settings. Citizens will need to be able to create new knowledge. Specialised knowledge and higher-order thinking skills will continue to be essential.

# Priorities and recommendations to create confident, connected, lifelong learners

This section explores the strategic priorities and proposes recommendations to achieve them.

## 1 Commit to meeting the needs of 21<sup>st</sup> century learners

To be successful in 21<sup>st</sup> century society, citizens must be able to operate effectively in an environment shaped by digital technologies, such as the increasingly pervasive use of the internet and social media. The future curriculum needs to equip learners for a lifetime of new technology and change.<sup>2</sup>

Digital competencies are more than just a set of technical skills. A competent digital learner has:

- the essential foundation knowledge, values and attitudes needed to deal proactively with a changing world
- digital literacy and media literacy
- the social competence to practise safe, legal, and ethical behaviours. Given the social nature of learning and the increasing need to collaborate, fostering and rewarding social competence is more important than ever. Responsible use of the internet and social media cannot be taken for granted and must be specifically learned.

We must equip our students with the knowledge, capabilities and values essential to participate fully and safely in an increasingly digital world. This is especially important for New Zealand, which is increasingly reliant on knowledge industries for economic growth.

One skill that will distinguish a digitally-competent person in the future is programming literacy; the ability to make digital technology do whatever one wants it to do, 'to bend digital technology to one's needs, purposes, and will'.<sup>3</sup> Programming skills are being applied across almost all disciplines. Contemporary programmers of technology include biologists, civil engineers, artists, musicians and designers. All students must have the opportunity to develop these skills and competencies if they are to be innovators, designers and creators, and not just passive consumers of technologies.

### **Curriculum design and delivery needs to change**

The need to teach digital competencies has implications for curriculum design and delivery. If every student and educator is to be a confident, competent user of digital technologies, we will need to provide curriculum resources and professional development opportunities for teachers. We will also need to evaluate how effectively these are being deployed.

---

<sup>2</sup> An overview of digital competencies is attached as **Appendix One**.

<sup>3</sup> This concept has received wide support from leading educators such as Marc Prensky and leading technologists such as Sir Tim Berners-Lee.

Current strategies are inadequate to the task. We urgently need a coordinated approach by education agencies and sector leaders. Our curricula, including National Standards and NCEA, must be interpreted with an eye to the future. They need to be understood and implemented in ways that promote and support students to develop 21<sup>st</sup> century skills and digital competencies.

To achieve a system-wide adoption of digital literacy, we must address assessment. We note that NZQA is planning to implement online exams with automated marking in the next decade and is rethinking assessment practices so they are fit for purpose: accessible online, directed towards assessment for learning, and available anywhere and at anytime.

A more flexible, responsive assessment framework, designed to support students to take charge of their own learning, will be a critical aspect of future-focused learning. Such a framework should be implemented as soon as possible.

### We recommend

---

#### 1. That the Ministry of Education:

- **recognise digital competencies as essential foundation skills for success in 21<sup>st</sup> century society**
  - **support digital competencies with cross-curriculum resources, a responsive assessment framework, professional development and a programme of evaluation.**
-

## 2 Achieve equitable access to digital devices for every learner

Personal use of digital devices, such as laptops, tablets and smartphones, has been evolving for around two decades. Devices have become increasingly affordable and mobile. Mobile digital devices provide versatile, engaging tools that allow students to learn, create, share and collaborate anywhere and at any time. Mobile digital devices will become as integral to teaching and learning in the future as textbooks, pencils and paper are now.

We expect that when all schools and kura have access to high-speed broadband, it will be the norm for learners to use personal digital devices. The 2012 School ICT Infrastructure Survey indicated that many New Zealand schools have introduced, or are introducing, one-to-one digital device programmes. Of the 600 schools that responded, 25% were implementing a ‘bring your own device’ (BYOD) programme, or intended to do so within 12 months of the survey.

ECE services, schools and kura planning to use digital devices school-wide have many factors to take into account. Some of these are strategic — why we are doing this?, how will it support better learning outcomes?, and how will we get families and whānau on board? Others factors concern operational issues — what infrastructure is needed to support devices?, how will we build staff capability?, and how will we ensure all learners benefit? We believe ECE services and schools should have access to resources and tools that help with their planning as they prepare to use digital devices for learning.

### **Consider how to meet the cost of digital devices**

**We recommend that the cost of digital devices should not be met by Government.** Evidence from Australia and the United States suggests centrally-funded initiatives are poorly-supported and struggle to meet their objectives.<sup>4</sup>

We think it reasonable to expect parents and whānau to meet the cost of digital devices. Best international and New Zealand practice demonstrates that more responsibility and care is taken with digital devices when parents own them. Taking devices home also has consequential benefits, which are discussed elsewhere in this report. Schools and their funding and hardware partners could provide back-up devices in case of technology failure and breakage, and ensure no student misses out.

While the cost of digital devices continues to fall, we recognise that some families might struggle to fund digital learning devices for their children. The students we are most concerned about are those for whom access to digital technologies could mean the difference between educational success and failure.

We propose that other options be explored to ensure all learners can participate. For example, we recommend partnering with businesses, charitable trusts and philanthropists to help establish

---

<sup>4</sup> For example, a \$1 billion pilot programme to provide iPads to students in the Unified Los Angeles district was put on hold this year when costs escalated, there were numerous security issues, and iPads went missing.

programmes that could subsidise or lease devices to students. Such partnerships could be part of the regional networks we propose as a key element of the change programme.

In some cases, interested funders are already actively engaged in successful existing initiatives, such as the Manaiaikalani Education Trust, based in Tamaki, Auckland. These could provide useful models from which to establish and administer new future-focused learning programmes that include equitable access schemes.

**We recommend Government provide some one-off seed funding in the 2014–15 financial year** for an equity fund. This funding would be used to stimulate rapid development of regional partnerships. Seed funding could be appropriated by Government from a variety of sources. These sources could include Community Development Grants or a special Ministry of Education appropriation. Government should also use its central procurement purchasing power to keep hardware costs down.

The Network for Learning managed network and new management practices should also result in savings for schools. This should allow them to re-prioritise funding to support digital learning.

### We recommend

---

2. **That the Ministry of Education provide guidelines on introducing and effectively using digital devices for learning, with the expectation that by 2017:**
    - all early childhood learners and school-age students will have access to digital devices
    - every student from Year 4 will have access to a personal digital device.
  3. **That the Government establish an equity fund in 2014 in partnership with businesses, charitable trusts and philanthropists. The purpose of this fund would be to help establish future-focused learning programmes in regional clusters. The programmes should include subsidies for digital devices for students from disadvantaged backgrounds.**
  4. **That the Government consider initial seed funding for an equity fund to be sourced through the 2014–15 Budget process.**
-

### 3 Invest in people and innovation

New buildings, new technologies, mobile devices and innovative applications will not improve learning on their own. Students, teachers and leaders must adapt their practices to make best educational use of these investments.

#### **Teacher practices vary widely**

The wide variation in pedagogical practices within and between ECE services, schools and kura is one of the biggest challenges facing New Zealand education. This applies to the adoption and use of digital technologies as much as it does to other aspects of education.

New Zealand is not alone in this. An international research report on innovative teaching and learning in seven countries found that:

...while we saw examples of innovative teaching practices in the classes we visited, a coherent and integrated set of conditions to support the adoption of innovative teaching was lacking in most of the schools and all of the systems in our sample.

ITL Research (2011, p.12)

A key finding of the report was that innovative teaching practices flourish when:

1. Teacher collaboration focuses on supporting peers and sharing teaching practices.
2. Professional development involves the active and direct engagement of teachers, particularly in practising and researching new teaching methods.
3. The school culture offers a common vision of innovation, as well as consistent support that encourages new types of teaching.

Innovative practices are evident in many New Zealand ECE services, schools and kura. These findings suggest that, to scale them up, we will need both 'top-down' and 'ground-up' approaches. One of the most critical priorities will be to support professional development, both formal and informal. Practitioners will need opportunities to learn about how to manage change, as well as how to change pedagogical practices to meet the needs of 21<sup>st</sup> century learners.<sup>5</sup>

#### **Innovation investment could be applied to education**

The Education and Science Select Committee and the Reference Group identified potential economic benefits from innovative teaching activity. These benefits include enhancing student performance, and creating international and local business opportunities based on the value of the intellectual property.<sup>6</sup>

---

<sup>5</sup> Pedagogy is defined as 'the science and art of education, specifically instructional theory'. The emphasis is on what teachers do, as distinct from what learners do.

<sup>6</sup> An example is Hapara's flagship product, Teacher Dashboard, developed with teachers at Point England School.

We believe that the Government should recognise education as a priority sector for innovation investment, primarily through research and development grants, alongside other areas such as high-value manufacturing and bio-sciences. We would also like to see a specific education challenge considered for the National Science Challenges. For example, such a challenge could build on how New Zealand leads the world in developing future-focused learning approaches in a multi-cultural society.

### **We need to support effective leadership and teaching**

Effective leadership is essential to successfully implement digital technologies for learning. We believe there needs to be a programme of ongoing support for leadership teams and boards of trustees as they work to transition to future-focused learning. It is not enough for a leadership team to provide an ICT infrastructure capable of meeting the school's varying teaching and operational needs. They must also build future-focused learning capability and support adopting digital technologies across the ECE centre or school. This can be challenging for leaders. They need support as they and their teachers start to rethink often strongly-held beliefs about students, curriculum, and teaching and learning.

Three specific actions would support effective leadership and teaching:

1. Require providers of initial teacher training to fully integrate digital technologies into their training programmes. Require them to include digital competencies in the standards for all teachers.
2. Make professional development opportunities available for all teachers and leaders, based on sound evidence of what works to build capability. The work of Professor Helen Timperley provides a strong basis on which to design professional development approaches (Timperley et al., 2007). We propose that regional networks, which we describe in more detail below, could facilitate professional development. Among other actions, networks could identify future-focused expert practitioners who could be released to work in ECE centres, schools and kura within each regional network.
3. Establish an Education Innovation Hub that would provide leadership, advice and guidance to the Government and sector and share best practice. In our rapidly-changing environment, collective progress often depends on trailblazing initiatives and emerging innovative practice. An Education Innovation Hub could also provide financial support and advice to regional networks, and could channel seed funding to promote innovation.

### **Investing in Educational Success**

The Government recently announced plans to invest \$359 million over four years to raise student achievement by supporting communities of schools to work together on shared student achievement challenges. Investing in Educational Success aims to support the education profession to build quality and consistency of teaching and leadership across the system. The Government intends to create four new roles to help grow and share effective practices across the communities of schools.

Digital technologies can play a powerful role in the networks, accelerating the pace of improvement and giving students, teachers and communities the means to create engaging learning environments, work together, and share information and data.

This report recommends that communities of schools be given access to resources and support to help them integrate digital technologies with effective teaching and leadership practices.

We recommend that the selection criteria developed for the four supporting roles be explicit about the importance of digital technologies for learning, and that this be included in any professional development provided to support those appointed to the four roles.

Investing in Educational Success also includes plans for a teacher-led innovation fund of \$10 million over two years to enable teachers to develop innovative and effective practice. We endorse this approach and believe it could complement the support we recommend in this report for the development of innovative educational technologies.

These are only our initial proposals. We have identified a range of possible measures that could be implemented to better support leaders and teachers. These include:

- updating the standards expected of graduate teachers to be explicit about digital competence
- updating the teacher registration criteria and professional standards for teachers and principals to be explicit about digital competence
- establishing a future-focused Master Teacher programme.

Such proposals would need further consultation to plan, evaluate and implement.

## We recommend

---

- 5. That the Ministry of Education address the need for a range of future-focused professional development opportunities for all educators during its review of professional learning and development support. These opportunities should be facilitated through communities of schools and designed using sound evidence of what builds capability in teachers and leaders.**
  - 6. That the Government's Investing in Education Success initiative be explicit about the role of digital technologies for learning, including reflecting the importance of digital technologies for learning in the selection criteria for the four supporting roles.**
  - 7. That the Government establish an Education Innovation Hub, supported by the Ministry of Education, to:**
    - **provide future-focused leadership**
    - **provide advice to the Government and education sector**
    - **identify and promote innovation in teaching and learning.**
-



## 4 Create future-focused learning environments

While learning has never been confined to a single place, the ubiquity of today's technologies, especially the internet, challenges the concept of the traditional school classroom as the sole place of learning. Digital technologies offer exciting possibilities for students to learn at the times, places and contexts of their choosing and many of the recommendations of this report will facilitate the emergence of modern learning environments that can capitalise on this.

### **Future-focused learning needs ultra-fast broadband access and services**

The Government is making a substantial investment to connect all schools to ultra-fast broadband internet services, create robust in-school network infrastructure and provide a managed network through the Network for Learning (N4L).

From 2017, we believe the scope of the N4L should be extended to include the early childhood education (ECE) sector, which also plays an important role in the emerging 21<sup>st</sup> century learning environments. This would expand teaching and learning opportunities, and help centres better manage escalating ICT infrastructure costs. ECEs should be given the same priority and preferential connection rates as schools in obtaining access to ultra fast broadband (UFB) and rural broadband initiative (RBI) connections.

As Crown-owned companies, the N4L and the Research and Education Advanced Network New Zealand (REANNZ) should be required to collaborate to provide seamless access to the connectivity, capacity, resources and services for teachers and learners. They should also look to offer emerging enablers such as Eduroam, a secure, worldwide roaming access service for education.

We would also like all learners to have access to the global database of education and research knowledge currently enjoyed by those schools that have joined the Kiwi Advanced Research and Education Network (KAREN).

### **Schools and libraries can be community hubs for digital learning**

It is said it takes a village to raise a child. The low levels of digital literacy in some communities risk lagging behind the deployment of ultra-fast broadband. We suggest developing funding incentives to support school communities wishing to establish community digital learning hubs. These incentives should include:

- prioritising library refurbishment
- supporting school librarians and teachers in charge of libraries to take a stronger leadership role in using digital technologies to target achievement outcomes for at-risk students
- extending opening hours.

Publicly-accessible facilities in libraries help to bridge the internet access divide. We encourage all public libraries to offer digital literacy training programmes and internet connectivity. We recommend that public libraries should also be given the same priority and preferential connection rates as schools.

## **Students' homes need affordable internet access**

Equitable digital opportunities require ubiquitous and affordable internet access. However, the 2012 Statistics NZ Household Survey reported that 69,000 households with dependent children still lack internet access. This shortfall threatens to be the new digital divide, where some students have 24/7 access to the internet while others have access only during school hours. Some Government-supported programmes, such as Computers in Homes, are helping to address this by providing affordable payment options for families in low-income communities. However, we need to scale up these programmes to reach all households with dependent children. We also recommend exploring other opportunities to close this gap.

As the copper network becomes increasingly redundant, new opportunities for providing an affordable internet service for families in low-income and/or isolated communities need to be explored.

It is exciting that the Government has endorsed the concept of internet service providers leveraging schools' fibre infrastructure to provide wireless services to communities where internet access is unavailable or unaffordable. This means schools can now use their ultra-fast broadband connections to become digital hubs for internet services, enabling access to be extended beyond the school boundary for students and teachers, the local community and businesses.<sup>7</sup>

For the foreseeable future, wireless internet services are expected to be the only economical option for many of the more remote areas of New Zealand. When new wireless spectrum is released for 4G/LTE networks, the Government could consider requiring spectrum bidders to provide 4G capability for public good at competitive rates.

## **Aggregated procurement and shared ICT infrastructure could improve management**

How technology is managed in schools can be improved through aggregated procurement and oversight, both nationally and regionally. Schools currently benefit from the Ministry of Education's software licensing arrangements and TELA Laptop Scheme. Improved economies of scale have allowed schools taking part in fibre loop aggregation initiatives to realise economic and quality advantages in procuring and managing infrastructure, services and devices.

The emergence of sophisticated UFB networks is opening up new ways of meeting schools' ICT infrastructure needs. For example, three initiatives across the Nelson-Marlborough Loop are providing schools with a highly-effective service, while reducing management time and costs. In the first, three large secondary schools have relocated their server infrastructure to a single off-site server system. In the second, by centralising identity management for access to cloud services and BYOD management, the Loop has enabled a number of smaller schools to become 'serverless'. And in the third, another group is sharing a library management system. In a further initiative, the Wellington Loop is operating a shared co-located server infrastructure for six Wellington CBD

---

<sup>7</sup> <http://www.minedu.govt.nz/theMinistry/EducationInitiatives/UFBInSchools/DigitalHubs.aspx>

secondary schools. These loops are using Ministry-funded single sign-on infrastructure. These initiatives deserve serious scrutiny, given:

- the sophistication and complexity of the infrastructure and network management needed to drive the digital learning environment
- the increasing struggle schools have to find the expertise and resources required
- the rollout of the N4L managed network.

### **Centralised data storage could reduce costs**

Many schools and service providers are expressing frustration with the current student management systems (SMS). Their frustration is likely to grow as schools move to using wireless technologies, cloud-based applications and portable devices. These require efficient and timely access to SMS data to manage user identities and drive Single Sign On, personalised learning resources, provisioning of multiple cloud environments and password management.

Furthermore, the need for easier access to data from other initiatives makes this an opportune time to consider centralised data storage. These initiatives include the new Progress and Consistency Tool (PaCT), Public Achievement Information (PAI), truancy information, Positive Behaviour for Learning (PB4L) and other future data.

We believe the Government should consider a shared, nationally-hosted back-end system that provides an integrated data repository, consistent with the all-of-government cloud strategy. Each SMS vendor could have its own front-end that delivers services such as parent portals. The data could be collected once through a back-end system and used many times by individual schools and service providers, as well as informing national educational analysis. This proposal should significantly reduce schools' training and support costs. We recommend an urgent investigation into this proposal.

## We recommend

---

8. That the Ministry of Education progressively equip all New Zealand schools, kura and ECE services with an ICT infrastructure that allows rapid technological change, including:
    - fibre, high-speed internet connectivity
    - upgraded school networks that include wireless
    - fit-for-purpose school property
    - seamless ICT support.
  9. That the Ministry of Education support the development of aggregated services, cloud-based applications, serverless schools and shared library services.
  10. That the Ministry of Education urgently investigate providing a centralised system to collect, analyse and disseminate student data.
  11. That the Government collaborate with businesses and communities to enable access to learning outside school hours. Initiatives could include:
    - digital hubs in public libraries and other community facilities
    - support for affordable internet access for all households with dependent children.
-

## 5 Invest in high-quality digital content and systems to make content easily accessible

The internet offers learners access to a wealth of content, but not all content is easy to find or offered at no cost. Nor is content always available in ways that make it accessible to all. No learner should be disadvantaged because of disability, geography, poor health, language, cost or lack of facilities. Learners with social, economic, health and disability issues face greater barriers to access and will require targeted actions to ensure equity of access.

### **Content is often not available, not accessible, or hard to find**

Little high-quality Te Reo Māori and Pasifika content is available in digital format. We believe this needs to be addressed (taking into account that cultural sensitivities may preclude some content being made freely accessible). We also believe that digital content and tools provided through government contracts must be created using principles of Universal Design. Universal Design makes digital tools and content accessible to all learners without having to be modified retrospectively.<sup>8</sup>

Not all content is freely available on the internet. Much valuable educational material is behind paywalls. Such material will not be readily found by a Google search. Furthermore, a significant legacy of New Zealand content is not in a digital form or adequately catalogued. It can be difficult for the independent learner to know how to search for available content and the best place to look.

### **Content related to the curriculum needs to be shared**

Teachers need content that relates to the curriculum and is free to use within current copyright rules. Current pedagogical practices in the education sector, and the ad hoc nature of the tools and facilities available, limit the degree to which teachers develop and share digital content. Connectivity is increasing, both within the education sector and across the community. Better connectivity will allow a more sophisticated architecture that can coordinate and enable sharing that is independent of time and place. We also need tools that make it easy to contribute, and incentives to encourage many more teachers to participate.

We believe that the Government should consider procuring whole-of-country access to licensed and copyright digital content for ECE services, schools, public libraries and digital hubs. We recommend that, by default, content produced by learners and teachers be made available for others to use under Creative Commons licensing. This will address the current anomaly that means that schools, rather than teachers, own the copyright to resources they produce. In turn, it will make it easier for teachers to share work and produce collaborative resources that everyone can use and build on.

---

<sup>8</sup> Principles of Universal Design for Learning are intended to help those creating curriculum resources and learning tools design them from the beginning with the needs of specific groups of learners (such as the visually-impaired) in mind.

## We recommend

---

- 12. That the Ministry of Education work with stakeholders and agencies to procure and curate appropriate international and New Zealand content, including Māori and Pasifika content, and make it easy and inexpensive to access.**
  - 13. That the Ministry of Education support the development of tools and systems that make it easy for users to find, share, re-purpose and create content.**
  - 14. That the Ministry of Education develop improved mechanisms and incentives for encouraging teachers and students to work collaboratively in creating and sharing digital content and resources.**
-

## 6 Build regional capability through collaboration

Schools have traditionally been relatively insular institutions. In New Zealand, the Tomorrow's Schools legislation (implemented almost 25 years ago) has tended to reinforce this. However, there are notable exceptions. Some schools have used the freedom and flexibility of self-management to seek partnerships with others. The Manaia Kalani Education Trust, the 'nets' (such as Otagonet) and 'loops' (such as the Nelson-Marlborough Loop) capitalise on the richness of the additional capacity and connections generated by broad collaboration. Strong connections extend participating schools' boundaries, resources and learning spaces. Partners include other schools, local communities, families, businesses, cultural institutions and higher education.

Creating wider partnerships should be a constant endeavour of the 21<sup>st</sup> century learning environment... This can be seen as 'capital investment', not so much in the conventional sense of renewing physical infrastructure, but in the forms of the social, intellectual, and professional capital on which a thriving learning environment depends.

Hargreaves and Fullan (2012, in OECD, 2013)

### **Expand existing regional networks and share professional learning**

We recommend that the Government supports expanding existing regional networks and promotes new networks. Such networks will create the conditions for greater 'lateral learning' across ECE centres, schools, tertiary providers, local iwi, local government and interested parties from the wider community. Central support could include funding, as well as guidance and facilitation, research and evaluation, teacher release time and professional development support. We expect regional networks to be informed and supported by the Education Innovation Hub. The Hub could offer seed funding for specific initiatives that extend innovative practice. The N4L should also support the development of collaborative communities.

Networking can ensure sustainable and cost-effective professional learning and development (PLD) for all teachers. Success requires developing in-school expertise and enabling connected communities of schools and ECE centres to share professional learning, expertise and resources. Much of the current innovative use of digital technologies in ECE, schools and kura is due to the passion of one or two teachers who inspired the rest of the teaching team (Timperley et al., 2007). Many future-focused teachers find themselves working in isolation, 'reinventing the wheel' with limited opportunities for sharing innovations or collaborating. This needs to change. We need much better mechanisms to share innovative practices and promote effective teaching and learning in all schools.

We believe that an effective solution could involve enabling expert 'future-focused' practitioners to share their expertise beyond their own institutions. We suggest that the Government explores possible models to mobilise the energy, knowledge and expertise that is present in ECE centres and schools around the country. Effective professional development involves the active engagement of teachers, particularly in practising and researching new teaching approaches. This means external expertise is often necessary to guide the 'teaching as inquiry' process and to challenge assumptions about learning with digital technologies.

## We recommend

---

- 15. That the Ministry of Education support regional networks to build local capability. Such support should include models to leverage the knowledge and expertise of the many practitioners in ECE services, schools and kura who are leading the way in future-focused teaching and learning.**
-



## **7 Build a robust evidence base**

Existing approaches to education research need to be enhanced. We need a coordinated research capacity to evaluate progress, share informed practice and develop models and frameworks to sustain system-wide improvements. We need to embed research and evaluation as core values. Decision making across the sector needs to be informed by empirical research, evaluation and best-evidence practice drawn from local and international sources. Evaluation needs to underpin the system, with theory informing decision making at all levels.

To be world-leading, we need to ensure New Zealand's teacher education and professional development are world-leading, with teachers-as-researchers recognised through incentives such as post-graduate study support, international participation and sabbaticals.

### **Research should underpin policy**

We have been impressed with the research into future-oriented learning and teaching undertaken by the New Zealand Council for Education Research (NZCER) for the Ministry of Education (Bolstad, Gilbert et al., 2012). In our view, the NZCER researchers have a good understanding of the transformative changes needed for 21<sup>st</sup> century learning. What appears to be missing is the commitment to make policy based on these findings.

### **Research should underpin decision making**

New Zealand's educational research is widely respected internationally, but relatively little evidence exists that it is making an impact in New Zealand classrooms. This has to change if we are to achieve the outcomes we aspire to for our learners. We recommend a comprehensive research programme that builds on existing local research, and examines digital teaching and learning practices in New Zealand ECE centres and schools. Research design needs to take into account the rapidly-changing nature of education technologies.

System intelligence should provide continuous, real-time feedback to monitor progress and inform ongoing refinements. Real-time data collection and analysis, made possible by connectivity to schools and centralised systems, will enable greater measurement of particular interventions and programmes. We also recommend that the private sector be encouraged to provide additional funding for research activity. For example, business intelligence and data-mining techniques are being used worldwide to inform educators in the emerging field of learning-analytics, where responses to changes in real-time data enable responsive and informed decisions.

### **Evaluative and theoretical research needs funding**

Funding is needed for ongoing balanced research programmes that contribute to both evaluative and theoretical knowledge. Partnerships between commercial, academic and practitioner interests could make purposeful use of performance and achievement data sets. Much can also be gained from forging international relationships and participation.

## We recommend

---

- 16. That the Ministry of Education reinforce research and evidence-gathering as core values in teaching and leadership practices. The results of research programmes should be disseminated in ways that make it easy for practitioners and policymakers to apply the findings.**
  - 17. That the Ministry of Education facilitate a comprehensive programme of research into digital learning from 2014. This research should systematically gather evidence of effective digital learning practices in New Zealand ECE services, schools and kura. The research methodology selected should reflect the highly-dynamic, rapidly-changing nature of education technologies. Findings should be widely and quickly shared as they emerge.**
-

## **8 Implement a coordinated, system-wide effort to align curriculum, digital technologies, property, infrastructure, funding and legislation**

A number of New Zealand early childhood centres and schools are well-advanced in their use of digital technologies for learning. Our challenge is 'scaling up' these examples of successful innovative practice so they become the norm. We believe this will require a concerted, system-wide approach using a mix of 'top-down' and 'ground-up' strategies.

### **The Government's role in a system-wide approach**

The Government has a role in:

- setting the vision and direction
- creating a coherent set of policies aligned to the vision and direction
- providing the supporting infrastructure
- aligning curriculum and assessment resources
- working in partnership with teachers, leaders and education agencies such as NZQA and ERO on a coherent cross-agency strategy.

For example, it will be important that NCEA assessment practices keep pace with digital innovations. ERO will need to monitor the extent to which early childhood centres and schools are integrating technologies into teaching and learning practices. Furthermore, current Ministry work programmes including Investing in Educational Success, establishing EDUCANZ, reviewing professional development for teachers and leaders, and creating modern learning environments need to be developed with system coherence as a specific priority.

Aligning Ministry of Education practices would help coordinate infrastructure and professional development to realise the benefits of the investment. As schools are modernised with flexible learning spaces, ICT infrastructure and connection to the N4L managed network, close attention should also be paid to building the educators' capability to teach in new ways.

### **Existing systems and structures need to change**

Scrutinising the effectiveness of existing structures will be important during implementation. Some parts of the Education Act are barriers to innovation and need to be reviewed, for example, those covering the length of the school day, hours of instruction, and enrolment and attendance requirements. If we are serious about supporting learning anywhere and anytime, breaking down institutional boundaries and allowing far greater flexibility to create tailored learning programmes around the needs of learners, then existing systems and structures, including school resourcing, will need to change.

Significant work will also be needed to enable the Ministry to conduct its business and manage its digital technology environment in a way that reflects what it expects of future-focused schools, leaders and teachers.

## We recommend

---

- 18. That the Ministry of Education, in partnership with key education sector leaders and agencies, develop a coherent, system-wide plan for future-focused learning. This plan should include, in consultation with the sector, addressing barriers to innovative teaching and learning by reviewing the Education Act 1989, existing structures, time constraints, technological issues and competing educational priorities.**
-

## 9 Design a coherent, flexible and robust funding structure to support 21<sup>st</sup> century learning

Funding for implementing our recommendations could come from new money, re-prioritising existing resources and establishing public-private partnerships.

Underpinning the effective use of digital technologies requires us to rethink much of what we believe about education. This will take time and resources over and above what is currently allocated. However, as this is about a step-change across the whole education system, resourcing could be found through better aligning relevant Ministry of Education and Government initiatives.

Already, several outstanding public-private partnerships yield significant benefits both for their partner students and schools as well as the system as a whole to learn from. A number of organisations have expressed interest in partnering in such initiatives.

In fact, the next challenges will be to achieve sufficient coordination between the key players to ensure coherence and that initiatives are based on both informed educational models and best practice. Key players include central government, regional initiatives, schools, their communities, tertiary providers, iwi, commercial interests and philanthropic entities.

### We recommend

---

- 19. That the Ministry of Education align its programmes and initiatives to maximise the effectiveness of educational spending to ensure coherence and reduce duplication.**
  - 20. That the Government prioritise funding to implement a *Future-focused Learning in Connected Communities* strategy and consider the potential for partnerships, including iwi, to support the strategy.**
  - 21. That the Government provide funding to implement a *Future-focused Learning in Connected Communities* strategy from new money, as well as re-prioritising existing resources and establishing public-private partnerships.**
-

## 10 Implement a comprehensive five-year plan from 2014

Change of this magnitude will require purposeful, comprehensive and robust implementation. The plan must ensure that components identified as essential for promoting the effective use of digital technologies are in place. We need an iterative, long-term strategy that includes agreed goals and progress measures. We recommend a five to ten-year change programme with initiatives properly aligned and sequenced.

We recommend a specialist group be set up to monitor the implementation programmes and provide advice to the Government, Ministry of Education and N4L on leading approaches to change and project management.

One of this group's responsibilities will be to ensure that implementation addresses the six lessons from the Auditor-General's overview of benefits realisation from public sector technology projects:

1. Understanding the environment and making the most of circumstances.
2. Using a business-led, flexible and agile approach.
3. Having strong support from leaders and senior managers.
4. Working effectively with the right people, including end users.
5. Using the right technology tools.
6. Monitoring and understanding the benefits.

### We recommend

---

**22. That the Government establish a specialist group to monitor and provide ongoing advice on implementing the *Future-Focused Learning in Connected Communities* strategy.**

**23. That the Ministry of Education implement the recommendations in this report over a five-year period to coincide with the deployment of UFB and N4L infrastructure.**

---

# Summary of strategic priorities and recommendations

## Strategic priority 1: Commit to meeting the needs of 21st century learners

---

- Recommendation 1. That the Ministry of Education:
- recognise digital competencies as essential foundation skills for success in 21st century society
  - support digital competencies with cross-curriculum resources, a responsive assessment framework, professional development and a programme of evaluation.

## Strategic priority 2: Achieve equitable access to digital devices for every learner

---

- Recommendation 2. That the Ministry of Education provide guidelines on introducing and effectively using digital devices for learning, with the expectation that by 2017:
- all early learners and school-age students will have access to digital devices
  - every student from Year 4 will have access to a personal digital device.
- Recommendation 3. That the Government establish an equity fund in 2014 in partnership with businesses, charitable trusts, and philanthropists. The purpose of this fund would be to help establish future-focused learning programmes in regional clusters. The programmes should include subsidies for digital devices for students from disadvantaged backgrounds.
- Recommendation 4. That the Government consider initial seed funding for an equity fund, to be sourced through the 2014–15 Budget process.

## Strategic priority 3: Invest in people and innovation

---

- Recommendation 5. That the Ministry of Education address the need for a range of future-focused professional development opportunities for all educators during its review of professional learning and development support. These opportunities should be facilitated through communities of schools and designed using sound evidence of what builds capability in teachers and leaders.
- Recommendation 6. That the Government's Investing in Education Success initiative be explicit about the role of digital technologies for learning, including reflecting the importance of digital technologies for learning in the selection criteria for the four supporting roles.
- Recommendation 7. That the Government establish an Education Innovation Hub, supported by the Ministry of Education, to:
- provide future-focused leadership
  - provide advice to the Government and education sector
  - identify and promote innovation in teaching and learning.

## Strategic priority 4: Create future-focused learning environments

---

- Recommendation 8. That the Ministry of Education progressively equip all New Zealand schools, kura and ECE services with an ICT infrastructure that allows rapid technological change, including:
- fibre, high-speed internet connectivity
  - upgraded school networks that include wireless
  - fit-for-purpose school property
  - seamless ICT support.
- Recommendation 9. That the Ministry of Education support the development of aggregated services, cloud-based applications, serverless schools and shared library services.
- Recommendation 10. That the Ministry of Education urgently investigate providing a centralised system to collect, analyse and disseminate student data.
- Recommendation 11. That the Government collaborate with businesses and communities to enable access to learning outside school hours. Initiatives could include:
- digital hubs in libraries and other community facilities
  - support for affordable internet access for all households with dependent children.

## Strategic priority 5: Invest in high-quality digital content and systems to make content easily accessible

---

- Recommendation 12. That the Ministry of Education work with stakeholders and agencies to procure and curate appropriate international and New Zealand content, including Māori and Pasifika content, and make it easy and inexpensive to access.
- Recommendation 13. That the Ministry of Education support the development of tools and systems that make it easy for users to find, share, re-purpose and create content.
- Recommendation 14. That the Ministry of Education develop improved mechanisms and incentives for encouraging teachers and students to work collaboratively in creating and sharing digital content and resources.

## Strategic priority 6: Build regional capability through collaboration

---

- Recommendation 15. That the Ministry of Education support regional networks to build local capability. Such support should include models to leverage the knowledge and expertise of the many practitioners in ECE services, schools and kura, who are leading the way in future-focused teaching and learning.

## Strategic priority 7: Build a robust evidence base

---

- Recommendation 16. That the Ministry of Education reinforce research and evidence-gathering as core values in teaching and leadership practices. The results of research programmes should be disseminated in ways that make it easy for practitioners and policymakers to apply the findings.
- Recommendation 17. That the Ministry of Education implement a comprehensive programme of research into digital learning from 2014. This research should systematically gather evidence of effective digital learning practices in New Zealand ECE services, schools and kura. The research methodology selected should reflect the highly-dynamic, rapidly changing nature of education technologies. Findings should be widely and quickly shared as they emerge.

## Strategic priority 8: Implement a coordinated, system-wide effort to align curriculum, digital technologies, property, infrastructure, funding and legislation

---

- Recommendation 18. That the Ministry of Education, in partnership with key education sector leaders and agencies, develop a coherent, system-wide plan for future-focused learning. This plan should include, in consultation with the sector, addressing barriers to innovative teaching and learning by reviewing the Education Act 1989, existing structures, time constraints, technological issues and competing educational priorities.

## Strategic priority 9: Design a coherent, flexible and robust funding structure to support 21<sup>st</sup> century learning

---

- Recommendation 19. That the Ministry of Education align its programmes and initiatives to maximise the effectiveness of educational spending to ensure coherence and reduce duplication.
- Recommendation 20. That the Government prioritise funding to implement a *Future-focused Learning in Connected Communities* strategy and consider the potential for public-private partnerships, including iwi, to support the strategy.
- Recommendation 21. That the Government provide the funding to implement a Future-focused Learning in Connected Communities strategy from new money, as well as re-prioritising existing resources and establishing public-private partnerships.

## Strategic priority 10: Implement a comprehensive five-year plan from 2014

---

- Recommendation 22. That the Government establish a specialist group to monitor and provide ongoing advice on implementing the *Future-focused Learning in Connected Communities* strategy.
- Recommendation 23. That the Ministry of Education implement the recommendations in this report over a five-year period to coincide with the deployment of UFB and N4L infrastructure.



# References

Bolstad R, Gilbert J, with McDowall S, Bull A, Boyd S, and Hipkins R, for NZCER (2012). *Supporting Future-Oriented Learning and Teaching: A New Zealand Perspective*.

ITL Research Project (2012). *2011 Findings and Implications*

Ministry of Business Innovation and Employment (2012). *Building Skilled and Safe Workplaces*, Business Growth Agenda.

OECD Centre for Education Research and Innovation (2013). *Innovative Learning Environments*.

Greaves, T, Hayes, J, Wilson, L, Gielniak, M, and Peterson, R, for MDR (2010). *The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness*.

SRI International and Microsoft Partners in Learning (2011). *Innovative Teaching and Learning Research: 2011 Findings and Implications*.

Timperley H, Wilson A, Barrar H, and Fung I (2007). *Teacher Professional Learning and Development: Best Evidence Synthesis Iteration*.

## Appendix one: Defining digital competency

Building the digital competence of our young people is crucially important when technology is changing faster than society. However, current strategies to equip our students with the knowledge, capabilities and values essential to participate fully and safely in an increasingly digital world appear woefully inadequate.

Digital literacy and digital citizenship are components of a demanding weave of digital competencies determined by the impact of digital technologies, the increasingly powerful internet, and pervasive social media.

Success in the 21<sup>st</sup> century requires the ability to navigate this new environment successfully. Castells (1998)<sup>9</sup> puts it more bluntly: ‘information technology, and the ability to use it and adapt it, is the critical factor in generating and accessing wealth, power, and knowledge in our time’. Thus, a key aspect of the emerging future-focused curriculum is the development of 21<sup>st</sup> century competencies. These are more than just a set of skills. They require foundational knowledge and values as well.

One dimension is the need to instil creativity, collaboration, problem-solving and entrepreneurial approaches. A second is to build digital literacy and media literacy. A third is to develop ‘adaptive competence’ — the ability to apply meaningfully learned knowledge and skills flexibly and creatively in different situations (De Corte, 2010).<sup>10</sup>

Given the social nature of learning and increasing collaboration, we also need to reward social competence. Good digital citizens take responsibility for their online content and actions, and practise safe, legal, and ethical behaviours. We need to be mindful of the personal and methodological competencies that enable lifelong learning.

‘The pace of technological innovation is being matched by cultural innovation in the use of new tools for civic and social purposes, fueling a clutch of exciting new trends, each of which offers tools, platforms, or practices of enormous possibility.’<sup>11</sup> But these trends benefit only those who have access to the necessary hardware, software and internet connectivity, and the digital competencies to use them.

Furthermore, students cannot hope to be digitally literate if they are not literate and numerate in the traditional sense, so a significant group in our society are doubly disadvantaged. To ensure all young people can deal proactively with change, we must ensure digital competency becomes a fundamental component of every student’s and teacher’s knowledge.

---

<sup>9</sup> Castells, Manuel (1998, 2nd ed., 2000). *End of Millennium, The Information Age: Economy, Society and Culture Vol. III*. Cambridge, MA; Oxford, UK: Blackwell. ISBN 978-0-631-22139-5.

<sup>10</sup> De Corte, Erik (2010), p.45 of the OECD Report: Innovative Learning Environments, September 2013.

<sup>11</sup> <http://www.knightcomm.org/part-ii-b/>

## Appendix two: Digital pedagogy

Pedagogy is simply described as ‘the science and art of education, specifically instructional theory’.<sup>12</sup> Thus, the emphasis is on what teachers do, as distinct from what learners do. Using digital technologies to enhance the educational process involves more than just learning how to use specific pieces of hardware and software. It requires understanding pedagogical principles that are specific to using technology in instructional settings.

The *New Zealand Curriculum* has a section on effective pedagogy<sup>13</sup> describing what the evidence suggests teachers can do so that students can learn best. The following statement linking the use of digital technologies (ICTs) and pedagogy is at the end of the section:

Information and communication technology (ICT) has a major impact on the world in which young people live. Similarly, e-learning (that is, learning supported by or facilitated by ICT) has considerable potential to support the teaching approaches outlined in the above section. For instance, e-learning may:

- assist the making of connections by enabling students to enter and explore new learning environments, overcoming barriers of distance and time,
- facilitate shared learning by enabling students to join or create communities of learners that extend well beyond the classroom,
- assist in the creation of supportive learning environments by offering resources that take account of individual, cultural, or developmental differences,
- enhance opportunities to learn by offering students virtual experiences and tools that save them time, allowing them to take their learning further.

The document further recommends that schools should explore not only how digital technologies (ICTs) can supplement traditional ways of teaching, but also how they can open up new and different ways of learning. To do this, we need to understand how digital technologies are becoming ‘game-changers’ in education, requiring us to rethink how teaching and learning are organised and managed.

Three key themes emerge as we consider this:

- ubiquity
- agency
- connectedness.

The importance of these themes is that they represent both the conditions for, and the drivers of, a change in the way education is provided and experienced in the 21<sup>st</sup> century.

---

<sup>12</sup> <http://www.thefreedictionary.com/pedagogy>

<sup>13</sup> <http://nzcurriculum.tki.org.nz/Curriculum-documents/The-New-Zealand-Curriculum/Effective-pedagogy>

## 1 Ubiquity

Digital technologies are being used in ways that mean the physical location of a ‘place of learning’ is increasingly irrelevant. Learners are now able to engage in their learning at any time, in any place and at any pace that suits their particular needs. It is true that traditional educational providers have acknowledged learning occurring in places other than in school (such as homework). However, using digital technologies to connect learners to their learning (and instruction) has become a game-changer that will significantly alter the way traditional schools and centres are organised and managed.

Ubiquity has three key drivers:

1. The significant increase in personally-owned, internet-capable mobile devices — enabling individuals to personalise and manage their interactions with others, their collections of content, and their learning experiences online.
2. The pervasive availability of wireless connectivity — making access from anywhere and at any time more possible, and indeed expected.
3. The emergence of cloud applications and cloud storage options — reducing the dependence on locally-hosted applications and content, and increasing the opportunity for connecting to them from multiple devices in multiple locations.

The shifts in thinking and behaviour, and the consequent changes in expectations that are created, present fundamental challenges to many of the structures and roles upon which our traditional system is established.

### **System-level implications**

- Review policies on school opening hours and attendance requirements.
- Provide core services nationally through managed network.
- Review the physical structures of schools and centres to encourage greater flexibility (MLEs).

### **Implications for schools/centres**

- Implement BYOD strategies and policies.
- Provide robust wireless access.
- Move to use of cloud-based services and applications where possible.
- Build infrastructure based on the notion of 24/7 access for students and staff.

### **Implications for teachers**

- Eliminate the notion of ‘homework’ — replace with learning in any location.
- Encourage appropriate use of personal devices across all areas of the curriculum.

## 2 Agency

In simple terms, the notion of ‘agency’ may be understood as having the ‘power or capacity to act and make choices’. Arguably, much of our traditional education system reflects its origins as an industrial age response to the need to produce literate and numerate people to work in the factories. This response resulted in earners grouped into age-based classes, promotion through the system based on age or achievement, and a standardised curriculum to ensure conformity. In such a system, the agency of the learner is not considered.

Instead, the system is premised on the belief that ‘we’ know what is best for you, and ‘we’ will make decisions in your best interests about where you’ll learn, what you’ll learn, and how you’ll learn it.

The increasing use of digital technologies inside and outside school allows tailoring of learning experiences to individual learners, to respond to learner-driven choices about where, what and how learning occurs. They allow learners to manage the evidence to support and to demonstrate their achievement as learners.

The principles of ‘learner-centredness’ have been espoused in educational literature for many decades. However, much of the system response to this has been to work at differentiating the way education is delivered. In contrast, ‘learner-centredness’ can embrace the notion that learners have agency over their learning, and the system exists to serve the needs and interests of the learner. Having agency as a learner is now becoming a default expectation, as young people become increasingly adept at using a variety of technology-enabled means to access, participate in, and even contribute to the learning that meets their needs.

### **System-level implications**

- Review policies where the institution is the focus for resourcing and so on, and change the policies to reflect a learner-centred approach.

### **Implications for schools/centres**

- Review all structures based on institution-centred decision making, such as; age-based classes, access to resources and timetables that restrict access to subjects of choice.
- Make greater provision for including and responding to student voices in all aspects of school operation.

### **Implications for teachers**

- Move from being the ‘deliverer’ of curriculum to being the co-creator and experienced learner.
- Model all appropriate values and attitudes as a digitally-literate learner.

## **3 Connectedness**

Connectedness is about ‘having a sense of being a part of something that is bigger than one’s self’. It is not about the technology, but it is all about being connected. Connectedness is having an impact on all areas of human activity.

The notion of connectedness requires us to rethink our traditional ideas about knowledge and education. Jane Gilbert<sup>14</sup> suggests that knowledge is now a verb, not a noun — something we do rather than something we have. She describes the ways our schools need to change to prepare people to participate in the knowledge-based societies of the future.

George Siemens has led the thinking around Connectivism as a learning theory for the networked age.<sup>15</sup> He suggests that learning now involves creating connections and developing a network. He argues that learning is a process of connecting specialised nodes or information sources, and that learners can exponentially improve their own learning by plugging into an existing network.

---

<sup>14</sup> <http://www.nzcer.org.nz/nzcerpress/catching-knowledge-wave-knowledge-society-and-future-education>

<sup>15</sup> <http://www.connectivism.ca/about.html>

The concept of networks and networking as the basis of human activity is central to all of this. Networks redefine communities, friends, citizenship, identity, presence, privacy and geography. They enable learning, communication, sharing, collaboration and community. Howard Reingold (2010) claims that 'Understanding how networks work is one of the most important literacies of the 21<sup>st</sup> century'.<sup>16</sup>

In a connected world, no individual person or organisation can 'stand alone'. The success of one depends on others, and the failure of one impacts the others. In such a world, synergistic benefits of knowledge creation considerably outweigh the accumulated benefits of individual knowledge.

### **System-level implications**

- Review all policies to encourage school clusters and networks to form, and to eliminate any rewards at a system level for individualistic, competitive behaviours.

### **Implications for schools/centres**

- Commit to participating both in local clustering arrangements and networks of choice as a part of core operation.
- Develop strong links and partnerships with community groups and other agencies.

### **Implications for teachers**

- Become active in personal learning networks for personal professional learning.
- Use digital technologies to mediate connections with outside groups and experts as part of regular class learning.

## **Conclusion**

Digital literacy is about significantly more than just another set of skills and knowledge to develop. Being digitally literate implies a fundamental change in the way one participates in and contributes to a digitally-enabled society. It also implies that society itself has fundamentally changed as a result of the impact of digital technologies.

The education system is no different. Digital technologies are fundamentally changing the learning lives of everyone in the system — teachers, parents and students. Being digitally literate is not just learning *about* or even *with* digital technologies, but is being able to participate fully in a digitally-enabled education system.

Similarly, digital pedagogy is about much more than simply teaching about or with digital technologies. Digital pedagogy recognises the fundamental shifts in the way learning is occurring, and responds in ways that value what we know about effective teaching. Digital pedagogy applies effective teaching in a context where learning is ubiquitous, where learners have agency over their learning, and where knowledge and understandings arise through the connections that are made in a network of provision.

---

<sup>16</sup> <http://www.slideshare.net/courosa/toward-networked-literacies>