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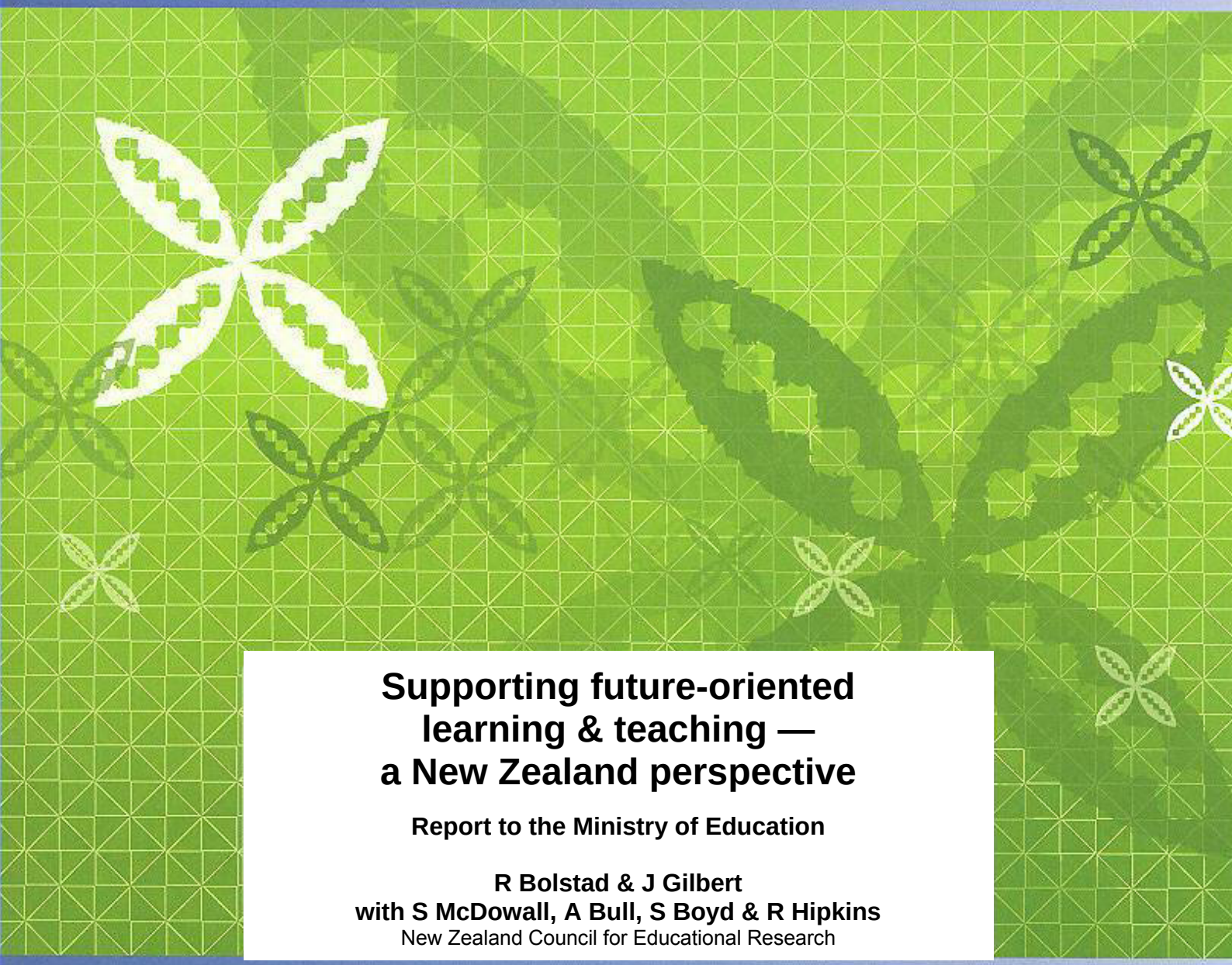

Supporting future-oriented learning & teaching — a New Zealand perspective

Report to the Ministry of Education

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Supporting future-oriented learning and teaching

A New Zealand perspective

Report prepared for the Ministry of Education

Rachel Bolstad and Jane Gilbert, with Sue McDowall, Ally Bull, Sally Boyd and Rosemary Hipkins
New Zealand Council for Educational Research

2012

Foreword from the Minister of Education

I want to ensure that New Zealand has a world-leading education system that equips all our young people with the knowledge, skills and values to be successful in a world that is increasingly complex, fluid and uncertain. A good education gives our young people opportunities and choices.

Supporting future-oriented learning and teaching – a New Zealand perspective focuses our attention on the potential of the learner and the importance of effective teaching in realising that potential.

This synthesis of findings from existing work and new research presents emergent principles that signal shifts in how we need to think about learners and learning.

Such an approach requires that we build our education system and the curriculum around the learner rather than the learner having to fit the system.

The roles of learners and teachers change as they work together to apply knowledge from a range of curriculum areas to generate new solutions to complex problems.

New kinds of partnerships and relationships with the community are possible as learners work with real challenges in a range of real world contexts.

Cultural and linguistic diversity are strengths to be nurtured so that all learners can engage confidently in a global environment.

A future-oriented learning system requires that all those involved in education are involved in continuous learning.

The New Zealand Curriculum and *Te Marautanga o Aotearoa* are enabling and future focused but we have yet to realise their potential. Substantial capacity for innovation exists within our education system. We must ensure that what are currently pockets of exemplary practice are spread and deepened across the system so that its best features become the experience of every learner.

Current and emerging technologies play an important enabling role in creating new learning opportunities and ways of learning. These technologies increase learners' motivation, engagement and achievement and foster innovative ways of working collaboratively. Our investment in 21st century technologies must be matched by new thinking that reflects the best teaching approaches and our natural cultural advantages.

I hope you will be as excited as I am about the opportunities for transforming our system that *Supporting future-oriented learning and teaching – a New Zealand perspective* provides — a transformation enacted by teachers, education leaders and communities that will enable all learners from all backgrounds to achieve success and shape the world of the future.

Hon Hekia Parata
Minister of Education

Message from Co-Director, Global Education Leaders' Program

This report is important and timely. The authors of *Supporting future-oriented learning and teaching – a New Zealand perspective* have brought together a synthesis of national and international research with the emerging practice of innovative school leaders and teachers.

The report supports the New Zealand Ministry of Education's programme of work to co-design and advance a 21st century education system. In doing so, this report constitutes a powerful set of messages for educators at the system and school levels in New Zealand and beyond.

New Zealand has been at the forefront of both educational research and futures thinking in education. This report captures New Zealand's forward looking policy and practice in '21st century learning'.

Informed by our new understandings about learning, 21st century learning principles are articulated, evidenced and animated by examples in practice.

A commitment to personalised learning, embracing diversity, rethinking learners' and teachers' roles, forging new partnerships — all fueled by disciplined innovation and new technologies — are identified as the key dimensions of a redesigned, connected and coherent 'learning system'.

This report does more than assist in sharpening the vision of what a future-oriented education system will look like for New Zealand learners. It strengthens the compelling case for transformation of our learning system, and provides guidance on how to accelerate the diffusion of 21st century learning practices.

Significantly, the report provides a vehicle for engaging, influencing and mobilising the education sector and other sector partners in the journey towards 'future-orientated learning and teaching'.

This report is one of the outcomes of New Zealand's participation in the Global Education Leaders' Program — a programme designed to accelerate and sustain transformation within GELP members' 'local' systems and nations — and to advocate and continually refine the vision of 21st century teaching and learning.

The report will, therefore, be shared within New Zealand, among GELP participating countries and more widely. It is important and timely because 21st century learning needs to be **the game** everywhere for everyone, so that all young people will thrive.

Anthony Mackay
Co-Director
Global Education Leaders' Program
http://gelponline.org/

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Executive summary

It is widely argued that current educational systems, structures and practices are not sufficient to address and support learning needs for all students in the 21st century. Changes are needed, but what kinds of change, and for what reasons? This research project draws together findings from new data and more than 10 years of research on current practice and futures-thinking in education. It aims to support the Ministry of Education's programme of work to develop a vision of what future-oriented education could look like for New Zealand learners. The work is guided by three high-level research questions:[1]

1. What could future-oriented learning and teaching look like, what ideas and principles underpin it and what makes it different from other teaching and learning practices?

2. What are the conditions that enable future-oriented learning and teaching? What are the issues and challenges?

3. How might transformational future-oriented learning and teaching approaches be promoted, enabled and sustained?

What is "21st century learning" or "future learning"? Educationalists first started to talk about "21st century learning" during the latter years of the 20th century. At that time, the phrase held connotations of the future, of change, of something "different" from practices of the day. However, now that we are in the second decade of the 21st century, the phrase is increasingly problematic. Does it still connote ideas and practices that are different, visionary or futures-oriented? Or does it simply describe ideas and practices that are currently happening? To avoid confusion, it is tempting to discard the term, yet this is also problematic since "21st century learning" has gained traction and is associated with an extensive body of relevant research. In this report we use the terms "21st century learning" and "future learning" interchangeably. We also begin from the premise that "21st century/future learning" is not a fixed prescription or known formula. Rather, it can be considered as an emerging cluster of new ideas, beliefs, knowledge, theories and practices—some of which may be visible in some schools and classrooms, some which exist only in isolated pockets and others which are barely visible yet. This report discusses some emerging principles for future learning, how these are currently expressed in New Zealand educational thinking and practice and what they could look like in future practice.[2]

How can we research the future of education?

The challenge is to develop a view of how the emergent cluster of principles that underpin future-oriented teaching and learning can be embedded at the whole-system level, enabling local and systemic development to support *all* New Zealand learners to successfully participate in, and contribute to, our national and global future as well as their own personal futures.

Research into present-day practice in schools and classrooms on its own cannot provide sufficient knowledge about how to address *system-level* challenges for innovation and transformation. However, looking at today's innovative teaching and learning practices can provide some insights into future possibilities, when integrated with theoretical arguments about the future of education.

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[1] Two subtheme questions of particular interest to the Ministry of Education run across the three high-level research questions. These are: "What is the role of current and emerging technologies?" and "What is the role of collaborative practices?"

[2] This work has strong parallels to the OECD/CERI work summarised in *The Nature of Learning: Using research to inspire practice* (Dumont, Istance, & Benavides, 2010, p. 621).

Why change is needed

During the latter half of the 20th century, international thinking about education began to shift to a new paradigm. This shift was driven by an awareness of massive and ongoing social, economic and technological changes, and the exponentially increasing amount of human knowledge being generated as a result. International thinking began to seriously examine questions about the role and purposes of education in a world with an unprecedented degree of complexity, fluidity and uncertainty.

Alongside economic, social, political and technological changes, many serious challenges characterise the 21st century world. Some authors describe these as "wicked problems". They are "highly complex, uncertain, and value-laden",[3] spanning multiple domains: social, economic, political, environmental, legal and moral. It is argued that learners—*and* teachers, school leaders and families/communities—need support to actively develop the capabilities they need to productively engage in 21st century wicked problem solving.

Many significant international projects have considered how schooling might change to better match the changes that have taken place in the 21st century. Two important ideas that underpin this work are (1) a shift in the meaning of "knowledge", and (2) the need to build education systems based around what we now know about learning.

New meanings for "knowledge"

The terms "knowledge age" or "knowledge economy" refer to a reorganisation away from an Industrial Age economy, where exploitation of natural resources, primary production, mass production and bureaucratic management hierarchies were the standard model for economic development. In the Knowledge Age, the ability to generate value through innovation (and the rapid creation of new knowledge) has become the basis for economic development. It is argued that education for the Knowledge Age must foreground the development of learners' dispositions, capacities or competencies to deal with new situations and environments, including those with high degrees of complexity, fluidity and uncertainty. This does *not* mean that knowledge no longer matters, or that the school curriculum does not need explicit goals for students' knowledge development. Rather, the future-focused education literature suggests we need to adopt a much more complex view of knowledge, one that incorporates knowing, doing and being. Alongside this we need to rethink our ideas about how our learning systems are organised, resourced and supported.

New understandings about learning

Research clearly shows that people do not learn well as "spectators", as passive recipients of pre-packaged, bite-sized pieces of knowledge delivered to them by experts: good learning requires active engagement in the "whole game".[4] The more people learn, the more they are capable of learning. Although some of these principles are understood by many teachers, our education systems and practices are often set up in ways that do not support these principles to operate in practice. If we are serious about building an education system that is capable of preparing young people for the "knowledge societies" of the future, we need to reconfigure it in new, more knowledge-centred ways. However, it will only be possible to do this when there is wider public awareness of the growing gap between the kinds of learning our young people are getting, and the kind of learning they need. There will also need to be wider public support for teachers and school leaders as they attempt what is effectively a paradigm shift in practice.

A useful metaphor: "Unbundling" schools

"Unbundling" is defined as "a process in which innovators deconstruct established structures and routines and reassemble them in newer, smarter ways".[5] This term is often used in the business and technology sectors but is also

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[3] See Frame and Brown (2008, p. 226).

[4] See Perkins (2009).

[5] Hess and Meeks (2010, p. 41).

helpful for thinking about the education system. It involves multiple ideas and practices coming together in ways that could "re-bundle" learning and teaching to better reflect the context and demands of the 21st century world.

The question is, *which* ideas should sit at the heart of this rebundling? Our work suggests at least six emerging principles. None of the principles is entirely new or revolutionary. However, the challenges of the 21st century provide a fertile context for all of these principles to come together to finally provide a coherent direction for designing a future-focused education system.

Emerging principles for a 21st century education system

Theme 1: Personalising learning

Personalising learning aligns with the idea that education systems must move away from an Industrial Age "one-size-fits-all" model. The idea of "personalising learning" calls for reversing the "logic" of education systems so that the system is built around the learner, rather than the learner being required to fit with the system.[6] This challenges us to think about how to deploy the resources for learning (teachers, time, spaces, technology) more flexibly to meet learners' needs. It also requires us to think about the *new* resources that may be needed, beyond those traditionally thought of as part of the schooling system, and to think about how best to support learners' access to those resources. While personalising learning-based approaches are being implemented in a limited way, in pockets and/or at the margins of the sector, we are not yet seeing the kinds of "deep personalisation" argued for by future-focused educationalists.[7]

Theme 2: New views of equity, diversity and inclusivity

Current educational policy typically concentrates on the issues of diversity, equity and inclusivity in relation to particular groupings of learners and communities for whom educational success has lagged behind that of other learners and communities. There is a recognition that these learners' and communities' needs have not been well met by the education system in the past, and a major goal of the current education system is to address the needs of "diverse" learners in order to raise overall achievement levels and reduce disparity.[8]

However, a future-oriented approach suggests that we need to develop new ways of thinking about equity and diversity. Achieving equity is not *just* about addressing the underachievement or disengagement of particular groupings of students and communities and bringing everyone closer to a single normative standard of what counts as success. This is particularly important given the arguments that currently accepted markers of success in education probably do not adequately reflect the kinds of learning that are needed for the demands of the 21st century. "Diversity" needs to be recognised as a strength for a future-oriented learning system, something to be actively fostered, not a weakness that lowers the system's performance. Diversity encompasses *everyone's* variations and differences, including their cultures and backgrounds. This calls for greater engagement of learners, family/whānau and communities in co-shaping education to address their needs, strengths, interests and aspirations, while also ensuring that all students—no matter where they are from or where their learning happens—have opportunities to develop and succeed according to the high-level educational aspirations set for, and agreed to, by New Zealanders as a whole.

A second idea that commonly comes up in discussions of equity/diversity and 21st century learning is that 21st century citizens need to be educated *for* diversity—in both the people sense and the knowledge/ideas sense. The changing global environment requires people to engage—and be able to work—with people from cultural, religious and/or linguistic backgrounds or world views that are very different from their own. Alongside this is another different but related imperative. Doubts about the ability of existing paradigms to solve current social, environmental and economic

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6 Green, Facer and Rudd (2005, p. 3).

7 See Leadbeater (2004, 2005).

8 In New Zealand this has been a particular policy focus for Māori and Pasifika learners and those with special learning needs.

challenges mean that a future-focused education system must provide learners with past paradigms *and* the ability to think between, outside and beyond them—that is, the ability to work with a *diversity* of ideas. It is argued that future-oriented learning should provide all young people with opportunities to develop these capacities.

Theme 3: A curriculum that uses knowledge to develop learning capacity

One of the biggest challenges for education in the 21st century is that our ideas about curriculum are currently underpinned by at least *two quite different epistemologies*, or models of what counts as knowledge. The first view is the "traditional" idea of knowledge as *content*, concepts and skills selected from the disciplines to form the "subjects" or "learning areas" of the school curriculum. From this point of view, the learner's job is to absorb and assimilate that knowledge into their mind and demonstrate how well they have done this through various means of assessment. It is assumed that this knowledge will be stored up for later use during the learner's life.

The second conception of knowledge is associated with the Knowledge Age/"21st century" literature. In this view, knowledge is seen as something that *does* things, as being more energy-like than matter-like, more like a verb than a noun. Knowledge, in the Knowledge Age, involves *creating* and *using* new knowledge to solve problems and find solutions to challenges as they arise on a "just-in-time" basis. These ideas about knowledge have emerged in the world outside education—driven in large part by economic, social and political changes, often facilitated by new technologies.

The Knowledge Age literature argues that reproducing existing knowledge can no longer be education's core goal, because (a) it is no longer possible to determine exactly which knowledge people will need to store up in order to use it in their lives after school, and (b) the "storing up for future use" model of knowledge is no longer useful or sufficient for thinking about how knowledge is developed and used in the 21st century. Instead, the focus needs to be on equipping people to *do things with knowledge*, to use knowledge in inventive ways, in new contexts and combinations. An individual's stock of knowledge is important as a foundation for their personal cognitive development: however, for it to be useful as a foundation for their participation in social and economic life, the individual must be able to connect and collaborate with other individuals holding complementary knowledge and ideas.

What this means for the school curriculum is a shift in what is "foregrounded". Instead of simply assuming these capacities will be developed through engagement with disciplinary knowledge (the traditional view), there is a shift to focusing on the development of *everyone's* capabilities to *work with* knowledge. From this point of view, disciplinary knowledge should be seen, not as an end in itself, but as a *context* within which students' learning capacity can be developed. While the use of the term "learning areas" in *The New Zealand Curriculum*[9] (*NZC*) document signals this, it is clear that this has not changed underlying thinking for many educators. It seems clear that the work of building a 21st century education system must involve supporting educators—and the public—to understand the paradigm shift in the meaning of such apparently common-sense terms as "knowledge" and "learning", and how this might change the way curriculum is interpreted into learning and teaching experiences.

Theme 4: "Changing the script": Rethinking learners' and teachers' roles

Twenty-first century ideas about knowledge and learning demand shifts in the traditional roles or "scripts" followed by learners and teachers. If the purpose of schools is not to *transmit* knowledge, then teachers' roles must be reconceived. Similarly, if the learner's main job is no longer to absorb and store up knowledge to use in the future, then learners' roles and responsibilities also need to be reconceived. This calls for a greater focus on recognising and working with learners' strengths, and thinking about what role teachers can play in supporting the development of every learner's potential.

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[9] Ministry of Education (2007b)

The idea of changing the scripts for learners and teachers is often shorthanded with phrases such as "student-centred pedagogies" or "student voice", alluding to the need to engage learners (and their interests, experiences and knowledge) in many decisions about their learning. However, the idea of sharing power with learners can be met with resistance, particularly if this is interpreted as an "anything goes" approach in which learners are given *complete* freedom to set the direction for their learning. The challenge is to move past seeing learning in terms of being "student-centred" or "teacher-driven", and instead to think about how learners and teachers would work together in a "knowledge-building" learning environment. This is not about teachers ceding all the power and responsibility to students, or students and teachers being "equal" as learners. Rather, it is about structuring roles and relationships in ways that draw on the strengths and knowledge of each in order to best support learning.

Theme 5: A culture of continuous learning for teachers and educational leaders

All of the principles discussed above suggest that teachers, school leaders, educational policy leaders and other adults supporting young people's learning need particular attributes and capabilities that enable them to work effectively towards a future-oriented learning system. It is important to note that some of the approaches advocated for 21st century learning—and the ideas that underpin them—may differ from what today's teachers, school leaders and educational policy leaders experienced in their own school learning. Teachers and school leaders may resist adapting current approaches if they don't see the need for change, or if they aren't convinced that adapting current approaches is possible, let alone likely to lead to better student outcomes.

It is important to note here that many "21st century" ideas about what meaningful learning looks like, and how to support it, are actually not new. They have been around for a very long time and are well supported and practised by many teachers. The challenge here is how to achieve a system shift that creates a more coherent educational ecology that can support what is known about good learning *and* that can accommodate new knowledge about learning and, importantly, new *purposes* for learning in a changing world.

This means that education systems must be designed to incorporate what is known about *adult* learning and cognitive development as well as what is known about young people's learning and development. This has implications for thinking about professional learning approaches and structures for teachers and school leaders: Are adults in the education system able to access the kinds of learning supports that they need in order to be the best leaders for a future-oriented learning system?

Theme 6: New kinds of partnerships and relationships: Schools no longer siloed from the community

Learning for the 21st century, it is argued, should support students to engage in knowledge-generating activities in authentic contexts. Students must learn to recognise and navigate authentic problems and challenges in ways that they are likely to encounter in future learning situations. However, today many learners encounter learning situations in which the "messiness" of the real world is simplified as contrived learning tasks with answers or outcomes already known to the teacher.

This implies that learning will require additional resources/support/expertise/input from a much wider range of people. Teachers ought not to be the only people from whom young people learn. As already argued (under the themes of personalising learning and equity/diversity), learning needs to be more connected with the community. Teachers still need strong pedagogical knowledge, but they also need to be able to collaborate with other people who can provide specific kinds of expertise, knowledge or access to learning opportunities in community contexts.

A final argument associated with this theme is that education and learning systems will not have traction to shift towards more 21st century approaches if this shift is not supported by the wider community. Public education is a collective good in which everyone has a stake. To be legitimate it must build our collective social and economic capacity *and* meet individual needs—immediate (and/or perceived) and future. To do *both* requires community

understanding of, support for and contribution to what is being attempted. This "buy-in" could be achieved by engaging community members in authentic educational activities that draw on their expertise.

Subthemes: New technologies and collaborative practices

The Ministry of Education expressed interest in exploring two subthemes within this work on 21st century teaching and learning. These are framed by the questions: "What is the role of current and emerging technologies?" and "What is the role of collaborative practices?"

The role of current and emerging technologies

As OECD/CERI notes, "the rapid development and ubiquity of ICT are resetting the boundaries of educational possibilities. Yet, significant investments in digital resources have not revolutionised learning environments; to understand how they might requires attention to the nature of learning."[10]

For the most part, educational thinking has moved on from the idea that simply introducing new ICT tools and infrastructure into schools will trigger beneficial and meaningful educational change. In New Zealand at least four strategies have been used to support educational ICT developments: providing enabling tools and infrastructure; providing inspiring ideas and opportunities to connect ideas; enhancing capability; and supporting innovation. Our analysis suggests that educational ICT development needs to be supported by all four strategies. This synthesis identified a range of ideas and practices associated with ICT—some of which reflect 21st century ideas about teaching, learning and knowledge, and others which do not. The potential of new technologies to transform teaching and learning is heavily dependent on educators' abilities to see the affordances and capacities of ICT in relation to the underpinning themes for learning for the 21st century outlined in this report. It is further dependent on schools having the infrastructure, inspiration, capability and opportunities for innovation to achieve these kinds of teaching and learning.

Role of collaborative practices

While networking and clustering have become increasingly popular in education, the range of reasons for, and outcomes of, networking and collaboration are often unexamined. School networks can vary in terms of their *goals* (which could include school improvement, broadening opportunities [including networking with nonschool agencies such as social services or business] or resource sharing), and their *timescales,* from short term to longer term relationships. Networking and collaboration *in themselves* do not necessarily support the emergence of future-focused learning practice. However, research suggests that educational clustering and networking provide opportunities for professional learning and expanding ideas about what is possible.

Policy implications

We conclude by putting forward three key ideas as a way to structure the thinking that will be needed to develop a policy/system response to the question of how we can rebuild New Zealand's education system for the 21st century. These three ideas are "diversity", "connectedness" and "coherence".

While these three key ideas inform all six of the key themes, they also allow us to see a way forward that goes beyond "ticking the boxes": that is, *are* schools personalising learning; *are* they educating *for* diversity (as well as working to achieve success for all learners); *are* they building learning capacity; *are* they reconceptualising the roles and responsibilities of teachers and students; *are* they engaged in continuous professional learning; and *are* they developing a range of new "real" partnerships with their communities? What is needed is, not more effort focused on the *parts* of this system, but strategies designed to *put these ideas together*: to join all this up in a way that is driven by a coherent set of shared ideas about the future of schooling and its purpose and role in building New Zealand's future.

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[10] See Dumont et al. (2010).

1. Introduction

The Ministry of Education commissioned this research project by the New Zealand Council for Educational Research (NZCER) as part of a programme of work to develop a vision of what future learning—or "21st century learning"—should look like for New Zealand students.

What is "21st century learning"?

It is widely argued that current educational systems, structures and practices are not sufficient to address and support learning needs for all students in today's world. The phrase "21st century learning" is frequently used when talking about the need for change, but what does it mean exactly? What kinds of changes, and for what reasons? This project begins from the premise that "21st century learning" or "future learning" is not a fixed prescription or known formula. Rather, it can be considered as an emerging cluster of new ideas, beliefs, knowledge, theories and practices—some of which may be visible in some schools and classrooms, some which exist only in isolated pockets and others which are barely visible yet. In this report we discuss some of the emerging principles that seem to be linked with 21st century learning. We look at how these principles are currently expressed in New Zealand educational thinking and practice, and what they could look like in future practice. The work is guided by three high-level research questions:[11]

1. What could future-oriented learning and teaching look like, what ideas and principles underpin it and what makes it different from other teaching and learning practices?

2. What are the conditions that enable future-oriented learning and teaching? What are the issues and challenges?

3. How might transformational future-oriented learning and teaching approaches be promoted, enabled and sustained?

How can we research the future of education?

Researching for the future is inherently difficult. Although there is some consensus among innovative educationalists about ideas that should underpin the future of learning, many of these ideas challenge the status quo and necessitate major changes to the current education system. Research into present-day practice in schools and classrooms cannot provide sufficient knowledge about how to address *system-level* challenges for innovation and transformation. However, looking at today's innovative practices (including what ideas underpin those practices, what impacts they have and what issues and challenges are associated with them) can provide some insights into future possibilities, when brought together with other future-focused ideas about learning for the 21st century. Our research approach had three aspects.

Aspect 1: Synthesis of prior research (August–October 2011)

In this phase we synthesised findings across a large number of previous NZCER studies which had a focus on "21st century teaching and learning", to develop a more coherent view of the key principles that seem to underpin future-focused approaches to learning and teaching , and how these have been expressed in New Zealand schools and classrooms in our prior studies. This component drew on studies that, collectively, include data from hundreds of learners and teachers from dozens of schools and classrooms (both primary and secondary). Key studies for this synthesis are listed in Appendix 1. We also drew on an extensive number of books, articles and position papers

[11] Two subtheme questions of particular interest to the Ministry of Education run across the three high-level research questions. These are: "What is the role of current and emerging technologies?" and "What is the role of collaborative practices?"

exploring educationalists' theories and ideas, and looked at various international developments linked with the "21st century" education literature.

Aspect 2: Online submissions from innovative school leaders and teachers (August–October 2011)

We invited New Zealand schools (teachers and principals) to submit short written accounts of their innovative/21st century/future-focused practices, the ideas and intentions that underpin these practices, perceived issues and challenges and the influences on their thinking about the future of learning.[12] The 29 submissions received were analysed in relation to the emergent principles for 21st century education and some relevant excerpts are cited in this report.[13]

Aspect 3: Further research with a small number of schools/teachers/leaders engaged in future-learning practices (October–December 2011)

In this phase we collected further data to develop a more in-depth picture of some of the practices described in the written submissions from Aspect 2. The intention in this phase was to dig underneath the practices to investigate the ideas, intentions and conditions that underpin the practices, how they are experienced and understood by teachers, learners and school leaders and the challenges/issues for sustaining and expanding these practices within the current system. Data collection in this phase comprised group teleconference interviews with 18 teachers and school leaders from 15 schools, and one-day case study visits to two schools, selected because their approaches appeared to add something new to the data we already had from the earlier phases. During the case study visits we interviewed school leaders, teachers and small groups of students, collected or viewed examples of school documents, curriculum planning material and student work and were guided around some of the schools' innovative learning spaces. In one school we were also able to view brief examples of student learning in action.

Characteristics of the New Zealand schooling system

As noted by the Ministry of Education,[14] New Zealand's system is characterised by:

- high levels of achievement for most students, but significant issues exist in delivering successfully for Māori students, Pasifika students and students with special education needs
- an enabling, flexible and future-focused curriculum which supports innovation and excellence at the best schools, but requires high levels of teacher professionalism and leadership
- a highly devolved and self-managing school system with few intermediate layers between the central decision makers and individual schools.

These characteristics raise the following challenges:

- encouraging more innovation and system transformation especially with respect to Māori, Pasifika and students with special needs
- ensuring that the best features of the education system become the experience of every student

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12 The call for submissions was advertised in the *Education Gazette* and other channels including NZCER's and the Ministry of Education's electronic newsletters.

13 This phase of the research was primarily aimed at identifying new examples of leading-edge thinking and practice. It was not intended as a representative canvassing or stocktake of the state of current practice in New Zealand schooling.

14 See the request for proposals for this research.

- ensuring that the most successful teachers, school leaders, researchers, professional providers and business/community partners are able to transfer their knowledge and expertise to others to assist the dissemination of effective practice that supports system-wide shifts in performance

- developing a more integrated, planned and disciplined approach to school improvement and system change without reverting to a top-down "command and control" model.

These challenges suggest that the shift to a 21st century/future learning system is *not* a straightforward case of "scaling up" individual successful examples so they can be replicated in more school and classroom contexts. What is required is a system transformation. We need to develop a view of how the emergent constellation of ideas, practices and principles that underpin future-oriented learning can become more embedded at the whole-system level, in such a way that it supports continuous local and systemic development to address the central goal of supporting *all* students "to develop the skills, competencies, knowledge, and understanding required to participate in, and contribute to, our national and global future".[15]

A useful metaphor: "Unbundling" schools

The metaphor of "unbundling" schools can help to frame thinking about what 21st century teaching and learning might involve. The term "unbundling"—defined as "a process in which innovators deconstruct established structures and routines and reassemble them in newer, smarter ways"[16]—is often used in the business and technology sectors. Borrowing this idea and applying it to schooling, Hess and Meeks suggest unbundling can occur in two dimensions:

- **Structural unbundling:** "in which we loosen our grip on traditional ideas about 'teacher', 'school', or 'school system' and explore how to deliver schooling in new and effective ways".

- **Content unbundling:** "unbundling the 'stuff' of learning … revisit[ing] assumptions about the scope and sequence of what students are expected to learn and explore new, more varied approaches to curriculum and coursework".

The notions of unbundling, and of "21st century" change, are often linked in people's minds with the developments in information and communication technologies (ICT). Technological developments are certainly one factor that can provide the impetus for, and support, unbundling. However, 21st century teaching and learning involves more than the impact, and increased use, of digital technologies. Rather, it involves multiple ideas and practices coming together in ways that could "re-bundle" learning and teaching to better reflect the context and demands of the 21st century world.

The question is, *which* ideas should sit at the heart of this rebundling? In the sections that follow we discuss six emerging themes associated with contemporary thinking about 21st century education.

Six emerging themes for 21st century learning

This report develops six emerging themes or principles that are linked with contemporary views of learning for the 21st century:

Theme 1: Personalising learning

Theme 2: New views of equity, diversity and inclusivity

Theme 3: A curriculum that uses knowledge to develop learning capacity

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[15] Request for proposals, p. 4.

[16] Hess and Meeks (2010, p. 41).

Theme 4: "Changing the script": Rethinking learners' and teachers' roles

Theme 5: A culture of continuous learning for teachers and educational leaders

Theme 6: New kinds of partnerships and relationships: Schools no longer siloed from the community.

The next section, "Why change is needed", briefly outlines the wider context that gives potency to these themes/principles. Subsequent sections address each theme/principle in further detail and draw from numerous research studies to discuss examples from, and issues for, practice. The final sections consider the role of new technologies and the challenges for initiating and sustaining innovation. Finally, we look at what may be needed to develop a policy/system response to the question of how we can rebuild New Zealand's education system around future-oriented learning ideas.

2. Why change is needed

Calls to reshape education for the 21st century

For much of the last century, there was a good fit between the education we provided and the education that was needed—by individuals, society and the economy. We used the best means possible (modern schools, professional teachers and formal exams) to deliver the kind of education needed for a relatively stable economy made up of large hierarchical organisations. However, it is widely argued that some key developments in the world have changed things so much that there is no longer a good fit between the education we are currently *providing* and the education we *need*.[17]

The first development is that we now know a great deal about how people learn: however, it is increasingly acknowledged that this knowledge doesn't fit very well with the way our current education system is organised. There is an increasing sense of doubt that continuing to improve what we do now is enough to equip our young people for life and work in the 21st century.

The second development is that there has been a shift in the way knowledge is thought about and used. For example, curriculum and syllabus development for most of the 19th and 20th century was framed in terms of what students ought to *know* (and, to a degree, what they should be able to *do* in order to demonstrate their mastery of this knowledge). In the latter half of the 20th century, international thinking about education began to shift to a new paradigm, driven by an awareness of massive and ongoing social, economic and technological changes, and the exponentially increasing amount of human knowledge being generated as a result. International thinking began to seriously examine questions about the role and purposes of education in a world with an unprecedented degree of complexity, fluidity and uncertainty.[18] Table 1 outlines some of the most significant international projects to address ideas about 21st century education.

Table 1 **Significant international projects to reconceptualise education for the 21st century**

UNESCO Task Force on Education for the Twenty-first Century (www.unesco.org/delors/)
In November 1991 the United Nations General Conference invited the Director-General "to convene an international commission to reflect on education and learning for the twenty-first century". The International Commission on Education for the Twenty-first Century was formally established at the beginning of 1993, chaired by Jacques Delors.[19]
OECD DeSeCo project (www.deseco.admin.ch/)
In late 1997 the DeSeCo project (the acronym of Definition and Selection of Competencies: Theoretical and Conceptual Foundations) was launched by the OECD with the aim of providing a sound conceptual framework to inform the identification of key competencies, to strengthen international assessments and to help to define overarching goals for education systems and lifelong learning. The findings of DeSeCo's multi-year research process are published in the final report *Key Competencies for a Successful Life and a Well-functioning Society*.[20]
Assessment and teaching of 21st century skills (ATCS) (http://atc21s.org)
This international project was designed by a Task Force of personnel from Cisco, Intel and Microsoft, and launched at the Learning and Technology World Forum in London on 13 January 2009. It involves six founder countries: Australia, Finland, Portugal, Singapore, the UK and the USA. The project aims to provide clear operational definitions of 21st century skills, solutions to technical psychometric problems that confront those seeking to develop tests of these skills, strategies for delivering assessments using ICT and classroom-based strategies for helping students develop these skills.

17 See Gilbert (2005) and Kress (2008).

18 See Delors (1998), Delors et al. (1996), Gilbert (2005), Kress (2008).

19 See Delors (1998), Delors et al. (1996).

20 Rychen and Salganik (2003).

The projects listed in the table above are just three of many which have considered how schooling might change to better match the changes that have taken place in society (including how economies and employment are structured in the 21st century). It is worth noting that organisations driving each of these projects represent a diverse range of perspectives and purposes.[21] Despite these different lenses, each project is generating similar conclusions about the nature of the challenges for learning in the 21st century, and what kinds of ideas need to underpin the redesign of educational thinking and practice as a result.

"Wicked" problems

Alongside economic, social, political and technological changes it is worth considering the nature of the serious challenges that characterise the 21st century world (e.g., climate change, waste disposal, educational underperformance, persistent poverty, biodiversity loss, etc.). The term "wicked problems" has been used to characterise these major challenges, which:

- don't present a clear set of alternative solutions—different "solutions" can create or exacerbate other problems
- tend to be characteristic of deeper problems
- have redistributive implications for entrenched interests
- involve "contradictory certitudes"—that is, different people or groups "know" what the answer is, but these answers are irreconcilable with one another
- tend to be persistent and insoluble: "we don't really solve them, and we're really not looking at optimal solutions—the best outcome—we're just looking for something that will damn well work".[22]

Wicked problems cannot be solved using straightforward puzzle-solving or mathematical solutions. They span multiple domains: social, economic, political, environmental, legal and moral, and are "highly complex, uncertain, and value-laden".[23] It has been suggested that they can only be addressed with "clumsy" solutions, and this involves bringing together disparate perspectives on the problem, in such a way that "all the 'voices' (are) heard and responded to by the others".[24] This idea has major implications for public engagement in decision making, and for education. It is argued that education for the 21st century needs to support learners (not to mention teachers, school leaders and families/communities) to actively develop the capabilities they need to productively engage in 21st century wicked problem solving.[25] This is not something that our current structures and systems were designed to achieve.

Twenty-first century views of knowledge

Jane Gilbert's book *Catching the Knowledge Wave?*[26] has been influential in New Zealand educational thinking, and provides a useful entry point into the ideas that the projects above have also addressed. She draws on a range of theories and evidence to argue that the 21st century has presented us with an entirely new way to think about knowledge, with profound implications for the way we organise schooling. This shift in social organisation is often referred to as the knowledge age, or the knowledge economy. Some of the key shifts are summarised in Table 2 below.

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21 For example, UNESCO's mission is a *humanist* one: "to contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information". The OECD "is an inter-governmental organisation that provides the setting for democratic and market oriented countries to study and develop economic and social policies with the ultimate aim of maximising *economic growth*" while the technology companies supporting the ATCS project each have their own corporate goals and philosophies about education, progress and development, particularly with respect to the role of *technology*.

22 Rayner (2006, p. 2).

23 Frame and Brown (2008, p. 226).

24 Verweij et al. (2006), as cited in Frame (2008, p. 1114).

25 See Bolstad (2011).

26 Gilbert (2005).

Table 2 **Old and new views of knowledge, and the implications for schooling**

Then	*Now*
• Knowledge was conceived of as something developed and known by experts, something that could be passed on from teacher to student, or manager to worker.	• Knowledge is rapidly created every day. Knowledge is the *process* of creating new knowledge. It is a product of "networks and flows"[27] coming into being through interactions and intersections on a "just-in-time" basis to solve specific problems as they emerge.
• Schools' job was to transmit this knowledge to students, and students' job was to absorb this knowledge in preparation for their lives after school. • Curriculum development was seen as the straightforward task of determining which knowledge students would need for their future roles, and organising this knowledge "into logical sequences of curriculum units that can be taught using expository, step-by-step methods, and assessed in ways that produce apparently clear, unambiguous results".[28]	• It is no longer possible to accurately predict exactly which knowledge people will need to draw on as they move through life in the 21st century. It has been argued that students need, among other things, opportunities to build their sense of identity, become self-reliant, critical and creative thinkers, be able to use initiative, be team players and be able to engage in ongoing learning throughout their lives.
• These structures also assumed a certain degree of stability and predictability in the kinds of jobs and social roles that people could move into once they left school.	• The kinds of jobs and social roles that people move into once they leave school are constantly evolving as a consequence of social, economic and technological developments, and an increasingly globalised, interconnected and interdependent world. In 21st century society, people who are able to work with knowledge are seen as a key resource for economic—and social—development.

As suggested in a UNESCO-funded report, education for the 21st century world must:

> simultaneously provide maps of a complex world in constant turmoil and the compass that will enable people to find their way in it ... It is not enough to supply each child early in life with a store of knowledge to be drawn on from then on. Each individual must be equipped to seize learning opportunities throughout life, both to broaden her or his knowledge, skills, and attitudes, and to adapt to a changing, complex and interdependent world.[29]

Twenty-first century learning thus needs to be organised around four fundamental types of learning:

> *Learning to know*, that is acquiring the instruments of understanding; *learning to do*, so as to be able to act creatively on one's environment; *learning to live together*, so as to participate and cooperate with other people in all human activities; and *learning to be*, an essential progression which proceeds from the previous three.[30]

The focus on *learning to be* foregrounds the development of learners' dispositions, capacities or competencies to deal with new situations and environments, including those with high degrees of complexity, fluidity and uncertainty. This is not to say that knowledge no longer matters, nor that school curriculum can be built without goals for students' knowledge development. Rather, 21st century education ideas suggest that our old ideas about what knowledge students need are no longer sufficient. Instead, as outlined above, it is argued that we need to adopt a much more complex view of knowledge, one that incorporates knowing, doing and being. In doing so, we need to rethink our ideas about how school learning can support students to develop in these ways.

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27 Castells (2000).

28 Bolstad and Gilbert (2008, p. 19).

29 Delors et al. (1996, p. 85).

30 Delors et al. (1996, p. 86).

What we know about learning

There is a vast body of research on learning. From this work a consensus is emerging that, if it was reduced to a list of key principles, it might look something like Table 3.[31]

The knowledge about learning shown in the table below shows clearly that people do *not* learn well as spectators—having prepackaged knowledge delivered *to* them—they need to be actively engaged in the "whole game". The more people learn, the more they are *able* to learn.

Although some of these principles are understood by many educators, our education systems and practices are often set up in ways that do not support these principles to operate in practice. If we are serious about building an education system that is capable of preparing young people for the "knowledge societies" of the future, we need to reconfigure it in new, more learning-centred ways. However, it will only be possible to do this when there is wider public awareness of the growing gap between the kind of learning our young people are getting, and the kind of learning they need. There will also need to be wider public support for teachers and school leaders as they attempt what is effectively a paradigm shift in practice.

[31] For fuller accounts of the research underpinning these principles, see: Bransford, Brown and Cocking (2000); Hattie (2009); Perkins (2009); Willingham (2009); Zull (2011). See also: Bereiter (2002); Christensen, Johnson and Horn (2008); Claxton (2002a, 2002b, 2007); Egan (2008); Fullan (2010); Pink (2009); Wagner (2008).

Table 3 **What we know about learning**

- Learning is much *more* than simply adding new concepts (or knowledge) to one's existing repertoire.
- Learning involves *thinking*. Knowledge is important to learning, and learning and knowledge are linked, but learning isn't just acquiring knowledge. Learners need knowledge to think *with*. They need to think *about* knowledge to remember it. Knowing stuff makes it easier to learn new stuff.
- *Experiences* are critical to learning. Just as learners need knowledge to think with, they also need experiences to think with. Children's thinking and learning processes are similar to those of adults, but their learning and knowledge has less depth because they have fewer experiences to draw on when processing new ideas or situations.
- Learners need to develop *in-depth* knowledge in some areas if they are to go on learning. Experts in a particular knowledge area think in terms of the deep structures or underlying principles of that knowledge, whereas novices tend to focus on the surface features. Seeing the deep structures allows experts to transfer what they know to new situations more easily than novices. They are also able to appreciate how a knowledge system works and what it can do, whereas novices are likely to think it just "is". Learners need to be encouraged to search not for the "right" answer (this produces a focus on surface features), but for the right *approach* to solving a problem.
- To learn, people need to be *actively engaged*—they need to be *doing* something, *thinking* something and/or *saying* something that requires them to actively process, interpret and adapt an experience to a new context or use. This sometimes involves finding a way to integrate existing knowledge with new knowledge, but sometimes it involves jettisoning existing knowledge.
- Learners have to *want* to learn the material. They have to be able to see a *purpose* to learning it—both in the short term, and in the longer term sense of seeing how learning this material will allow them to contribute to something beyond themselves.
- Learning has to be a *personalised*—not a standardised—experience. Learners have to feel in charge of their own learning. They need to feel that they know what they are doing, and that they can control the pace of their learning. They need to "get into it" enough to get a sense of flow and progress; they need the right amount of challenge (not so much that it is beyond them, but not so little that it is boring); and they need feedback along the way (not just at the end of the course). Young children need help to do this, but to learn more (and become better learners), they need to be able to regulate their own learning and become less and less reliant on the teacher to regulate the pace and goals of learning.
- Learning (usually) needs *structure*. Adults play an important role in young children's development by structuring their experiences and directing their attention to certain aspects of those experiences. Older children and adults need some sort of map to orient themselves and find out where they are up to. In educational contexts the subject areas usually provide this map.
- Learning involves *interaction*—trying out and testing ideas with others. Some or all of it takes place in the context of relationships with other human beings. Sometimes these are people who know more than the learner, sometimes they know less and sometimes they are learning together. A precondition for learning, then, is that the learner feels acknowledged and valued by their co-learners, that they feel they belong to, or are part of, the culture of the learning context.
- Learning needs to take place in a wide *variety of settings*, not just at school, in a classroom, if learners are to be able to transfer and use their learning in new contexts.
- Intelligence—or intellectual capacity—is not fixed, but is expandable (through the right kinds of experiences). Expanding people's intellectual capacity should be *the* key function of an education system.

Developing a new vision for the future

Charles Leadbeater argues that:

> a new consensus needs to be forged about the kind of learning we should aspire to provide, a consensus that parents, children and teachers can buy into in the everyday life of going to school as much as policymakers designing the education systems of the future.[32]

The development of a future-oriented learning system will also require support from the wider public.[33] This is a significant challenge. It is very difficult to imagine something as familiar as our school system in ways that depart significantly from what we have today. And even if we can imagine something different, it is not easy to *get* from where we are today to where we aspire to be tomorrow: as some commentators have pointed out, it is a bit like trying to build a plane while keeping it flying. Disruptive events that interrupt the regular flow of the system—such as the recent earthquakes in Christchurch—can open the possibility for change, and at least one group of innovative educators in Canterbury has seized the chance to collaborate to create a cohesive, compelling vision and direction for the future of education in their city.[34] However, as the authors of this discussion paper note:

> One of the biggest risks we face in re-establishing the provision of schooling in Christchurch is that we lapse into using terms like 'going back', and 'back to normal'. To allow this to happen would be a mistake, and a lost opportunity to address the issues that currently inhibit change. We need to:
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> - Look widely to innovative models of schooling provision that are emerging elsewhere in New Zealand and internationally.
> - Engage with education leaders and visionaries who are leading this development.
> - Seek to establish new models of governance, leadership and roles for teachers, and make it compelling to adopt these.
> - Embrace a technologically-enabled view of the future, and plan for and adopt practices that are innovative and successful.
> - Draw on the wisdom of international thinkers around the development of learning spaces (physical and virtual), especially those that are anchored in a community context.[35]

To be genuinely future oriented we should not have to wait for disruptive events to develop the conditions for innovation that Leadbeater and many others talk about. The sections that follow set out what is known, and what we do not yet know, about the opportunities, challenges and tensions for developing a teaching and learning system based on future-oriented thinking about education.

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32 Leadbeater (2011, p. 6).

33 This idea is addressed in further detail in Sections 3, 4, 8 and 10.

34 They suggest the development of a federated learning model, where learning hubs encourage collaboration across sectors, communities and services (Shaking Up Christchurch Education Network, 2011).

35 Shaking Up Christchurch Education Network (2011, p. 17).

3. Personalising learning

Why does personalising learning matter for the 21st century?

The idea of "personalising learning" is simple and familiar "in the sense that it is about trying to build learning around the needs of individual pupils, something that has been practised by many good teachers for years".[36] However, it is much more complex when interpreted from a 21st century perspective. Here, the emphasis is on a major *systems-level shift*. It calls for reversing the "logic" of education systems so that the system is built around the learner, rather than the learner conforming to the system.[37]

A snapshot from practice[38]

At the heart of the Albany Senior High School (ASHS) curriculum is the intent to build strong relationships with students, ensuring as part of this process that every individual builds a coherent, personally relevant and engaging learning pathway through their senior secondary school years. Thus the manner in which support for learning is organised energises and informs all the other aspects of curriculum delivery and provides a set of processes for ensuring no student falls through the cracks …

Two of the 100-minute blocks of time each week are devoted to tutorials. At these times, students meet in small groups with the tutor teacher who is their designated mentor. Some of the time is taken up with more formally organised learning-to-learn activities but it mainly provides a space for responding flexibly to different students' learning needs. All the adults in the school have a group to mentor. This allows numbers in tutor groups to be kept as low as possible and also allows students to be matched with an adult who might best support their specific learning needs …

Learning to be a school for new times has required the teachers to delve deeply into their views of learning and the pedagogical practices associated with those views … The idea that energises [the school curriculum] is the intent to foster agency and the development of greater autonomy in learning. Both students and teachers are supported to be self-directed in pursuing learning questions of relevance and importance to them, and to actively work to build meaningful connections and coherence across the breadth of their work. This challenge also entails a future-focused dimension—it as much about who teachers and students are now and might become in the future as it is about what they know and can do now.

Education built to meet 21st century learning needs

Personalising learning aligns with the idea that education systems must move away from an Industrial Age "one-size-fits-all" model:[39]

> It requires schools to radically rethink how they operate. Many of the basic building blocks of traditional education: the school, the year group, the class, the lesson, the blackboard and the teacher standing in front of a class of thirty children, have become obstacles to personalised learning. Personalised learning means differentiated provision to meet differentiated needs. All the resources available for learning—teachers, parents, assistants, peers, technology, time and buildings—have to be deployed more flexibly.[40]

Personalising learning also challenges us to think about what *new* resources may be needed to support learning, and how learners can access these—including resources that have not traditionally been thought of as part of the schooling system.[41]

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36 Besley (2004, p. 4).

37 Green et al. (2005, p. 3).

38 Abridged from Hipkins (2011).

39 See previous section; also Bolstad and Gilbert (2008), Gilbert (2005).

40 Leadbeater (2005, p. 7).

41 An example could include greater involvement of people and organisations from different sectors including business, community, health and social services.

Collaboratively reshaping education as a public service

Today's schools can personalise learning—to an extent—if they are committed to this idea. However, certain constraints at the system level can impact the extent to which learning can be personalised. This is where personalising learning addresses *systems-level* change. Two key papers by Charles Leadbeater set out the depth and extent of system change connected with this idea.[42] His view of personalising learning is linked to ideas about reinventing the way public services are shaped. "Personalisation", or user-centred reform of public services (including education), involves "users" and "professionals" working together to shape public services that address users' needs, values and aspirations.[43] For Leadbeater, personalising learning offers a practical route to success for *all* learners, first, because it aims to encourage learners to develop motivation and high aspirations for their own learning, and second, because it involves creating ongoing relationships and interactions that support learners to realise these aspirations:

> It demands a system capable of offering bespoke support for each individual that recognises and builds upon their diverse strengths, interests, abilities, and needs in order to foster engaged and independent learners able to reach their full potential.[44]

Developing every person's potential

This may be the most important dimension of the 21st century view of personalising learning. The goal is *not* simply to find better ways to raise everyone's "achievement" to an identical level or standard, but rather to support every person to develop their full potential. This benefits both the individual (who can experience success in ways that matter to them and to people within and beyond their communities), and society (because the system would no longer generate failures simply because some individuals can't conform to, and succeed in, a one-size-fits-all system).

"Deep" versus "shallow" personalisation and new conceptions of equity

Leadbeater[45] distinguishes between what he calls "shallow" (or simple) personalisation and "deep" (or complex) personalisation. For him, "shallow" personalisation is not transformative. It offers "modest customisation of mass-produced, standardised services to partially adapt them to user needs" but in ways that *don't question or change the assumptions and values that underlie the standard services*. "Deep" personalisation, on the other hand:

> … would give users a far greater role—and also far greater responsibilities—for designing solutions from the ground up.

The 21st century personalising learning idea engenders new conceptions of equity. Equity is no longer seen as "sameness". In post-modern democratic societies, people need the space and support to work out their own particular "ways of being". The theme of equity, diversity and inclusivity is discussed further in the next section.[46]

What are the issues for practice?

Research undertaken in a variety of New Zealand schools highlights a range of opportunities and tensions for personalising learning in practice. Synthesising across many studies, we have identified some of the common issues and opportunities for the expression of personalisation of learning. Below we discuss various examples borrowing Leadbeater's terminology of "deep" and "shallow" expressions of personalisation in three areas: genuinely involving

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42 Leadbeater (2004, 2005).

43 Leadbeater argues that children, parents, families and communities are an "under-utilised resource" in the current education system and suggests that a personalised learning approach could particularly benefit families and communities who have disengaged from education or dropped out of the system, thinking that education and learning are not relevant, not rewarding or simply "not for them".

44 Leadbeater (2004, p. 7).

45 Leadbeater (2006, p. 102).

46 Personalising learning, as described by the authors cited in this section, is not linked with the "marketisation" (or privatisation) of education. It is *not* linked with approaches that see learners as simply the "consumers" of education services, and education as solely an individual good. It cannot be *reduced* to catering for different "learning styles". Rather, it is a genuine attempt to develop a renewed, 21st century version of the traditional social democratic goal of equal opportunity for all.

students in shaping their own learning, engaging students in relevant real-world learning opportunities, and opportunities for personalised pathways

Genuinely involving students in shaping their own learning

Personalising learning is intended to support learners (and their families) to feel that they are co-investors[47] in their own learning, helping them to develop motivation and high aspirations, and creating ongoing relationships and interactions that support learners to realise these aspirations. However, various studies[48] indicate subtle but important differences between schools and classrooms where students are *genuinely* involved in co-constructing meanings and practices associated with their learning, and schools in which teachers or students may use learning words but scratching below the surface, teaching and curriculum practices are still largely "business as usual". The differences between deep and shallow expressions of personalisation are often evident when having conversations with students about their learning. Learners who have had the time, support and opportunities to have input into shaping their learning tend to be better able to describe in their own words what they have come to learn about their strengths, weaknesses, motivations and interests as learners, and how this relates to other contexts of their lives, including their ideas about how they see themselves in the future. In deep expressions of practice, students' learning activities and the curriculum/knowledge content they engage with are shaped in ways that reflect the input and interests of students, as well as what teachers know to be important knowledge. In shallow expressions of practice, the curriculum content is still determined by the teacher, and students' input is limited to more shallow choices about which activity(ies) they will undertake to master the knowledge determined by the teacher. Even if students are able to use the "learning language" that the school seeks them to adopt, they may have only a superficial sense about why the ideas are important or how they relate to their learning in everyday life, or in relation to their futures.

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47 In a nonfinancial sense.

48 For example, research on schools that were early adopters of ideas associated with *NZC* (Boyd et al., 2005; Boyd & Watson, 2006; Cowie & Hipkins, 2009; Hipkins, Roberts, & Bolstad, 2007).

Table 4 **Deep and shallow expressions of personalisation through students' engagement in shaping learning**

Deep expressions of practice	*Shallow expressions of practice*
• Ideas about learners and learning have usually been developed and reflected on critically over several years within a school (or professional learning network).	• Schools are captured by "fads", picking up lifelong learning ideas and jargon from educational "gurus".
• Schools may seek ideas from educational specialists, or develop their own language and concepts to talk about learning, but these are integrated into the school's "big picture" about the purposes for learning. There is a coherence across the various ideas that are picked up and integrated into the schools' learning vision.	• Teachers and school leaders may think and talk extensively about what these ideas and words mean for learning, but strategies for developing students' learning capacities can become simply more "things for students to learn".
• Learners have genuine input into shaping what happens in their learning; not only how they learn, but also what sorts of learning activities happen in their class/school. • Learners (not just teachers) believe that students have input into how things happen in their classrooms and school.	• Students are socialised into using terms, practices and approaches that are designed to support them to become "lifelong learners", but don't actually have any role in shaping these practices nor the ability to critique or challenge them; their engagement with the words and practices is shallow.
• Learners can link their school learning to other aspects of their lives, or see connections with their goals or aspirations for their lives beyond school.	• Learners don't carry these ideas, practices and language into other aspects of their lives, because they aren't connected to or shaped by the students' interests and life contexts.
• The curriculum is not a predetermined set of content to be learned. Rather, the learning activities students undertake are shaped to connect with, extend and challenge students' interests, bringing them into relationship with curriculum knowledge. Students develop and use knowledge working on learning activities that are meaningful to them (see Section 5).	• The words and practices can become a tool for socialising students into "correct" behaviours (e.g., to encourage students to be more resourceful and/or self-managing) but the curriculum itself does not change—learners are still expected to learn the curriculum content decided by teachers.

Engaging students in relevant real-world learning activities

Personalising learning can also be achieved by supporting students to learn through authentic, relevant, real-world contexts, where students' interests, aptitudes and the issues and opportunities within their own communities can form the basis for learning. We have researched many initiatives in which students, both primary- and secondary-aged, learn through projects involving real-world contexts, often solving a problem or generating something new in collaboration with other people in their communities.[49] This is discussed further in Sections 5 and 8. In deep expressions of practice, students are involved in the key aspects of decision making, and can fully experience the messiness of a real-world project, complete with the unexpected changes in direction, opportunities and challenges that can arise. In shallow expressions of practice, students may be involved in real-world projects or engage with authentic contexts, but the nature of the learning approach, the time frames and the curriculum content to be addressed are still largely determined by the teacher, and students experience the learning as more or less "business as usual". Sustaining community-linked real-world learning opportunities often requires time for new partnerships and relationships to form between schools

[49] See, for example: Bolstad, Cowie and Eames (2003); Bolstad, Roberts and McDowall (2010); Boyd et al. (2005); Boyd and Watson (2006).

and people/groups, and teachers and learners need to become comfortable in new roles in order to support learners to have more agency and ownership of the direction and outcomes of their learning work (see Sections 6 and 8).

Opportunities for personalised pathways

Personalisation can involve shaping students' learning pathways in ways that support their needs and interests, open and expand each learner's experiences and offer them chances to think about who they might like to become and what they might like to do in their lives beyond school.

As a result of work undertaken for the Ministry of Education[50] during the drafting of *NZC*, we developed a series of metaphors to help us think about some of the shifts that have happened over time in secondary education (particularly in the senior secondary years). Each metaphor represents a step towards greater personalisation (Figure 1), with the last of these metaphors, "The Networked Campground" (Figure 2), a metaphor for imagining how a highly personalised approach to education (particularly for secondary-age students) might work.

[50] In 2005 the Ministry of Education commissioned NZCER to undertake a background paper on the changing shape and scope of the senior secondary curriculum and possible future directions, including looking at what was happening in other countries. The background paper was later developed and adapted into a book. See Bolstad and Gilbert (2008).

Figure 1 ***The river metaphors***

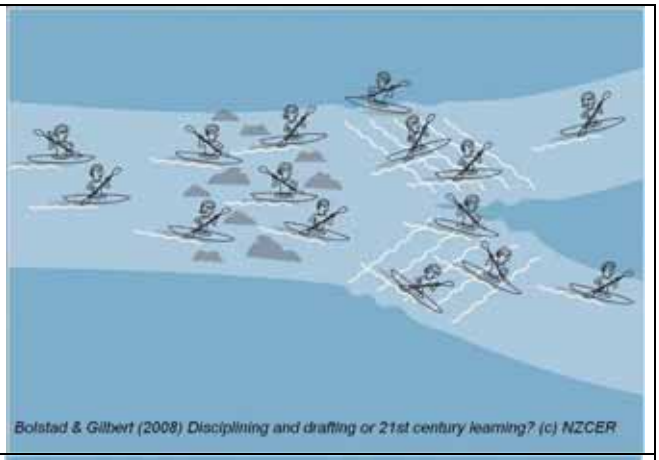
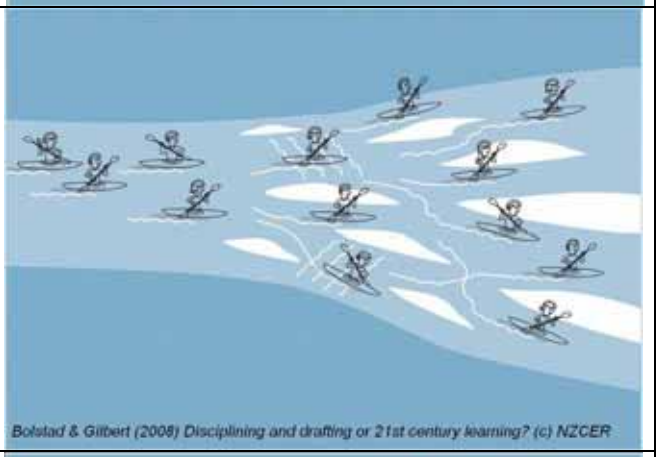
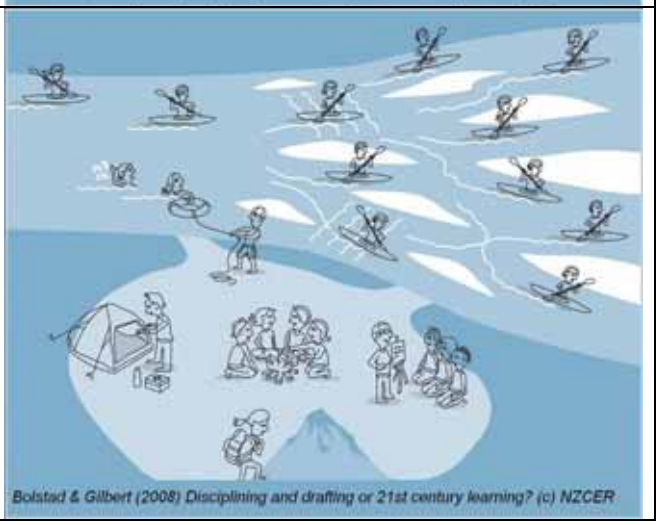
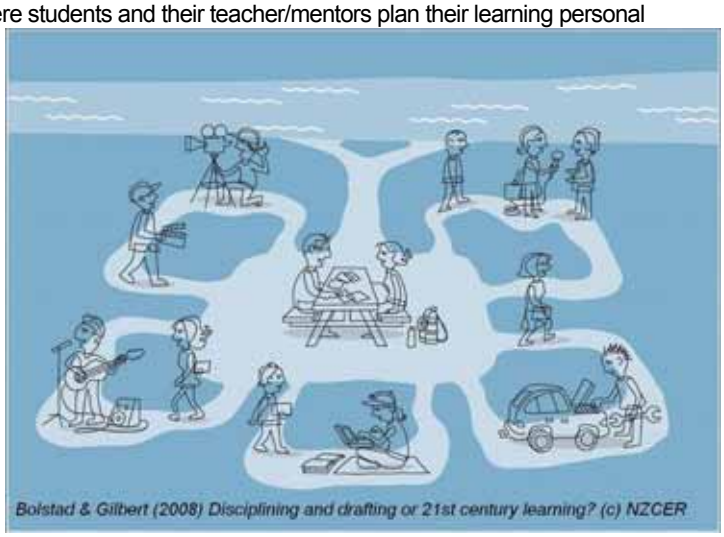
The Forked River This metaphor represents the traditional senior secondary system. Here we have students paddling along through their senior secondary years, navigating through the "rapids" of exams and qualifications, and gradually getting sorted towards one of two pathways—the academic, and the vocational.	
The Braided River This braided river metaphor acknowledges that people will take different pathways when they leave school, but the "rapids" (i.e., qualification structures) are organised so that people's options are not closed down early by early subject choices, and to allow people to change courses. Students can follow their interests, but also change their minds and work towards a different post-school pathway, all the while continuing to move down the secondary school river.	
The Rescue Stop The third metaphor adds in a stop-off point for students who are having trouble navigating or even staying afloat. These could be students with learning difficulties, or students with other difficulties in their lives that have meant that school has either not been a priority or has not met their needs. To avoid allowing these students to "drown", a campground area is set up to give these students a different, non-"mainstream" senior secondary experience. The camping ground teachers are more like mentors and the students spend time learning together as a group, mixing work experience learning with programmes designed to develop life skills, personal development skills and the educational basics.	

Figure 2 ***The Networked Campground***

The Networked Campground metaphor represents a more personalised approach to learning in which it is possible to get somewhere by a variety of different routes, at a speed that suits the individual. The river system moves into the background, as do the old hurdles and the old emphasis on subjects. Lifting everyone's game is in the foreground. The central goal is to develop certain competencies in everyone, to use—and build on—people's strengths and interests, while also ensuring that everyone has the basics, via a system that allows people to follow personalised learning pathways.

The centre of the campground picture is the place where students and their teacher/mentors plan their learning personal programmes. The camping ground could have several different "loop tracks" that lead to a variety of different learning experiences. Some of these could resemble traditional work experience programmes; or they could involve researching the skills and knowledge required for different kinds of jobs. Other experiences could involve designing, setting up and carrying out a research project that investigates and recommends solutions to a real local issue or problem. The purpose of these experiences, together with others, is to provide contexts which will develop students' overall capacity to learn: to do things with knowledge, to be curious and questioning, to think and learn independently and to evaluate—and improve—their own thinking and learning.



Elements of The Networked Campground metaphor can be seen in practice in some New Zealand schools' approaches to curriculum and teaching. One example is Albany Senior High School (ASHS), highlighted in the excerpt at the beginning of this section. At ASHS, learning time is organised in ways intended to foster greater student engagement and autonomy. Three key timetable structures and their accompanying processes form the framework on which teachers construct a curriculum relevant to their students' needs:

- On one day of the week the more traditional timetable structure is suspended and students conduct "impact studies" of their own choosing and design.
- During the other four days, learning time is organised into extended blocks of 100 minutes' duration (60 minutes is more usual in New Zealand high schools) during which students undertake studies in their chosen "specialist subjects". They have two such blocks of time per subject per week.
- Two of these 100-minute blocks are allocated as tutorial time when students can access guidance from their tutor/mentor and practise the skill of working independently.

It is not so much that any one of these features is startlingly new. However, the manner in which they are put into practice as a coherent whole, and supported via a multilayered structure of professional learning networks, gives them an innovative edge. This complex and integrated learning structure (for staff as well as students) is a key enabler of the school's ongoing process of becoming a school for new times. Another key enabler is the development of a "pedagogy for young adults" which pervades school life.[51]

A case study of changes at Taihape Area School between 2006 and 2009 illustrates another systematic and intertwined approach. The formation of the area school on a new site in town, and the arrival of *NZC*, together provided a timely

[51] See Hipkins (2011).

opportunity to re-vision and redesign the school. The overall aim was to reculture the school away from deficit and traditional practices towards strengths-based democratic and inclusive approaches that involved students, staff and the community in a learning partnership. The school began with a concerted effort to reach out to the school community, and particularly to parents, so that *everyone* was re-engaged with the school, not just the students.[52] In 2007 the school started an options system for Years 7–13 students. Monday and Friday became option days, with core classes held mid-week. To enable students to try multiple options, the timetable was changed to a semester system. One aim was to provide choices so that students gain a wide range of experiences and have more ownership over learning. Over time the emphasis sharpened from offering a wide range of topics to a focus on "pathways for Years 1–13 students that go into the community and the region". The school made connections with local businesses and employers to better tailor their learning programme to local career opportunities. Similar examples are reported in the Curriculum Implementation Exploratory Studies and other research.[53]

Stonefields School (a primary school visited as part of this research project) illustrates some of the other conditions and ways of thinking that can help to foster personalisation of learning. These include attention to thinking about teachers' and learners' roles and power relationships, physical learning environments and beliefs about what kinds of learning are important. These are described in two excerpts in later sections of this report.[54]

Summary: What is currently happening vs. what needs to happen

While personalising learning-based approaches are being implemented in a limited way, in pockets and/or at the margins of the sector, it seems that this concept is poorly understood, and yet to be fully implemented.[55] As well as rethinking the way the school organises its resources to support more personalised approaches, there is also the challenge to take personalisation *beyond* the (relatively) easy level of redeploying the school's existing resources (teachers, spaces, time) in ways that better support personalisation. It is more difficult to find examples of personalisation that *significantly* extend, expand or reshape teachers' and learners' relationship to their local community, or that reflect the kind of "deep"—that is, transformative—personalisation described by Leadbeater. The authors of one recent New Zealand study argue that there is a need for specific and ongoing advocacy by the Ministry of Education of personalising learning as an effective learning approach that could scaffold the development of a fully 21st century education system.[56]

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52 See Hipkins, Cowie, Boyd, Keown and McGee (2011).

53 For example, see: Bolstad et al. (2010); Boyd et al. (2005); Hipkins et al. (2011, p. 29); and the "snapshot from practice" in Section 4.

54 See boxed example 3 in Section 6, and the "snapshot from practice" in Section 7.

55 See, for example, Hargreaves (2010), Kelly (2007).

56 Bevan-Brown, McGee, Ward and MacIntyre (2011).

4. New views of equity, diversity and inclusivity

Why does this idea matter for the 21st century?

Discussions of equity, diversity and inclusivity and "21st century learning" tend to draw on two quite different sets of ideas. First is the idea that producing educational engagement and success for *all* learners is an important priority for 21st century schools. Underpinning this is the recognition that certain major social groups have not been well served by the education system in the past; that this has contributed to current social inequities; and that this is a problem that—if it is not solved—has major implications for New Zealand's social, political and economic future.[57] A major goal of the current education system is to address the needs of "diverse" learners in order to raise overall achievement levels and reduce disparity. This issue isn't new—addressing educational inequalities has been a major focus of much of our official education policy for 70 years or more. What *is* new is that in the new global economic environment, this issue has become *the* major policy priority. Contemporary policy solutions to this problem usually focus on remedying some sort of "deficit" or "lack". This could be a deficit in the system (for example, in its organisation or its practices), or some sort of deficit in the individuals or social groups who don't engage with or succeed in the system. The 21st century learning literature would argue that these solutions are "20th century thinking"—in that they use and replicate certain key 20th century assumptions which are part of the problem.[58] Building a 21st century education system requires us to think differently about this long-standing problem: however, as we show later in this section, it seems we are only just beginning this process.

The second idea that commonly comes up in discussions of equity/diversity and 21st century learning is that 21st century citizens need to be educated *for* diversity—in both the people sense and the knowledge/ideas sense. The changing global environment requires people to engage—and be able to work—with people from cultural, religious and/or linguistic backgrounds or world views that are very different from their own. While some people have always done this, it wasn't necessarily expected of everyone in the past (this was particularly the case for members of socially dominant groups): however, this is now seen as an essential aspect of 21st century citizenship.[59]

Alongside this is another different but related imperative. Doubts about the ability of existing paradigms to solve current world problems and the parallel development of the "wicked problems" literature (outlined elsewhere in this report) mean that a future-focused education system must provide learners with past paradigms *and* the ability to think between, outside and beyond them—that is, the ability to work with a *diversity* of ideas.

When these two sets of ideas are put together, it becomes clear that the 20th century, one-size-fits-all, "production line model" of schooling must be replaced by a more "organic", network-based model in which multiplicity, diversity and difference are actively *encouraged* (as opposed to being tolerated). As outlined above, this means diversity of people *and* diversity of knowledge/ ideas. We need new metaphors to help us think about this. One possibility is to use the biological idea of a clade. A clade is the opposite of a clone, an organism that is an exact replica of the parent organism.

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[57] In New Zealand the underserved social groups are Māori, Pasifika and students with special educational needs (including gifted and talented students).

[58] These include assumptions about "ability", knowledge and power, equality and individuality. For a discussion of these assumptions, see Gilbert (2005), especially Sections 5 and 6.

[59] Many countries, including New Zealand, have responded to this by reconceptualising their civics and citizenship education programmes with a focus on "cosmopolitan citizenship"—that is, "learning to imagine the nation as a diverse and inclusive community" (Osler and Starke, 2003, p. 245). See also Appiah (2006). New Zealand is one of 38 countries that participate in the international civics and citizenship education study (ICCS) which examines the way countries prepare young people to undertake their roles as citizens. See Schulz, Ainley, Fraillon, Kerr and Losito (2010, pp. 13–14).

Biologically speaking, a clone is an appropriate response to a stable environment, but, because it is usually highly specialised for that environment, it is an evolutionary dead-end, and will die out if that environment changes. Clades, on the other hand, are unspecialised organisms that have the capacity to occupy a wide range of new and different environments when these become available. Because they are the foundation organisms for new evolutionary pathways, they are most successful in times of great environmental change. If the aim of the 20th century education system was to turn out clones, to reproduce in the new generation the best of what had gone before, then, it could be argued, the aim of 21st century education systems should be to produce clades, life-long, independent learners with the capacity to live, work and prosper in a whole range of as yet unknown new environments.

One way to build this "capacity for diversity" is to orient schooling around exploring the *connections*—or spaces—*between* people, things and ideas, and *what can happen there* (rather than focusing on the people, things or ideas themselves). As we argue in Section 9 of this report, the development of an ultra-fast broadband network for schools is, if we want to think about it this way, the ideal catalyst, or facilitation space, for "concretising" this sort of thinking.

Thinking about diversity in the ways outlined above provides a space for thinking in new ways about the "old" issue of educational inequality alongside other important 21st century needs.

Learning in Aotearoa New Zealand as a specific place in the world

As well as rethinking learning for a globalised world, future-oriented educational theory also challenges us to rethink learning in relation to the specific social, historical, cultural and environmental "place(s)" learners are situated in. Place-based educational theorists argue that school curriculum and pedagogy has "often distract[ed] our attention from, and distort[ed] our responses to, the actual contexts of our own lives (places)".[60] This is partly a legacy of seeking to standardise curriculum knowledge and teaching so that all learners would (ideally) have equal access to more or less the same kinds of educational opportunities, no matter who they are or where they live. However, place-based theorists argue that education should aim "… to develop in learners a love of their environment, of the place where they are living, of its social history, of the bio-diversity that exists there, and of the way in which people have responded and continue to respond to the natural and social environments".[61] It is argued that we need to think of learners as current and future "place makers" who will sustain, transform or create the "places" in which we/they live. Supporting students to participate meaningfully in the process of place making requires their school learning to have visible and meaningful connections to local, as well as national and international, contexts, knowledges and resources.

The key idea here is that in 21st century education we need to take much more account of *who* learners are, *where* they are and to what and to whom they are *connected*, at all levels from the local to the global. Learning experiences should develop and strengthen learners' connections and relationships as part of building their overall capacities as learners and actors in the world.[62]

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60 Gruenewald (2003, p. 621).

61 Penetito (2004, p. 11).

62 *NZC* reflects some of these ideas; for example, in the vision of young people who are "connected to the land and environment", "members of communities" and "contributors to the well-being of New Zealand—social, cultural, economic, and environmental". The roots of New Zealand's specific culture and history are reflected in the aspiration to "work to create an Aotearoa New Zealand in which Māori and Pākehā recognise each other as full Treaty partners, and in which all cultures are valued for the contributions they bring" (Ministry of Education, 2007b, p. 8). The curriculum principles include the intentions to: ensure that students' identities, languages, abilities and talents are recognised and affirmed and that their learning needs are addressed; acknowledge the principles of the Treaty of Waitangi, and the bicultural foundations of Aotearoa New Zealand; reflect New Zealand's cultural diversity and value the histories and traditions of all its people; and have meaning for students, connect with their wider lives and engage the support of their families, whānau and communities.

A snapshot from practice[63]

In Ka Hikitia (Ministry of Education, 2007a) there is an attempt to shift the focus of education from participation and success of Māori to participation and success as Māori. In both 2007 and 2008 we found examples of school-based education for enterprise (E4E) initiatives that were driven by Māori aspirations. In our first report we described three Northland schools in which "being Māori" was normalised—all had high Māori student enrolment, Māori principals and relationships with whānau, marae and rūnanga. These three schools had developed E4E to support the educational priorities of the schools and their students. In doing so, they provided examples of what enterprising learning and enterprising schools might look like in these contexts. We returned to one of these schools in 2008 to see how it had further developed.

The school's principal was involved in many community activities and worked both with his own staff and with schools across the region, to build a regional sense of collective and self-determination. He contributed to a vision and a voice in and for the region about what enterprising schools could look like for Māori communities. Staff we spoke to in 2008 appeared to share the principal's vision of enterprise for and as Māori:

> [We are] looking for solutions to issues within our school and local community—looking at our own internal strengths—what's pumping in our blood. (Year 10 agriculture teacher)

The principal's vision was to provide students with learning experiences that would support them in the communities and areas of work they would most likely find themselves. To this end the school had adopted a "trade school" approach through involvement with Tai Tokerau Trades Training, and had established academies in the areas of carpentry, hospitality, agriculture and horticulture. The trade school involved bringing trained tutors, largely from nonteaching backgrounds, into the school to help run authentic learning activities (such as building houses for community auction, and running a café). In doing so, they provided a model for how school/community boundaries can be opened up and different forms of knowledge shared.

What are the issues for practice?

Drawing from a range of studies, some key issues for practice are outlined below.

Who decides what counts as success?

Policies and programmes designed to support greater community engagement to support students' learning success may come with embedded ideas about how and why schools need to engage *particular* communities, and about what they wanted to gain from "partnership" with these communities. This can be problematic for two main reasons. First, it may limit the opportunity for those communities to define the ways in which they would wish to be involved or the types of outcomes they might want a partnership to achieve. Second, there may be unexamined assumptions which may not be shared by all involved. It can take time to work through these assumptions and enable genuine negotiation of goals and approaches that work for the particular learners and communities involved.

The 2007–9 Education for Enterprise (E4E) Regional Clusters Initiative was interesting because it was intended to be shaped and interpreted locally to be responsive to local contexts and communities. Early findings from the evaluation of this initiative[64] suggested that views about the purposes of E4E, particularly in relation to building sustainable partnerships with business, were sometimes interpreted as the need to foster individual achievement, financial gain and moving above and beyond the community. In the Manukau cluster, these interpretations did not always seem to be consistent with the goals and values of some of the Pacific people we interviewed, or with their hopes and dreams for their young people. However, in Manukau, as in other regions, we saw the emergence of initiatives where E4E *was* interpreted and enacted in ways that aligned with school/community educational priorities for Māori and Pasifika students. There were community collaborations that drew on cultural strengths, interpretations of the meaning and value of being "enterprising" in relation to local aspirations/contexts. One example is the secondary school discussed in the boxed excerpt above. However, across the other regions, staff views on how E4E might support the aspirations of Māori

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63 See Bolstad et al. (2010, pp. 155–157).

64 Bolstad et al. (2010).

and Pasifika students and communities varied, and many teachers' responses to these questions suggested that this was not something they had really thought about. This leads to the next issue for practice.

How "ready" are schools to engage with these ideas?

One challenge for schools is overcoming the tendency to slip into thinking about diversity *mainly* in terms of the cultural diversity that is present in the school and its community. While this is not the only way of thinking about diversity, it remains important, and raises some interesting questions about the ways that different schools might respond to and work with diversity, since they will vary in how culturally diverse their communities are.

Some schools in the 2008–10 Curriculum Implementation Exploratory Studies (CIES) were very focused on ways to better meet the needs of their Māori students. Taihape Area School, discussed in the previous section, illustrated one example of a school working with iwi and whānau to build bridges, a local curriculum and acknowledge diversity. However, CIES[65] also identified that only some schools were fully engaging with the idea of "Māori students succeeding as Māori". The research highlighted a need for ongoing conversations about what this could look like.

Similarly, many teachers in the evaluation of the E4E Regional Clusters Initiative commented that, at their schools, staff did not think of Māori students differently from other students. This finding is not just about E4E and reflects wider educational issues, highlighting the necessity of school staff engaging with the messages of *Ka Hikitia*[66] and of initiatives which include a focus on the aspirations of Māori and the Treaty of Waitangi as part of their strategies and practices.

Te Kōtahitanga is an example of an initiative underpinned by ideas about responding appropriately to diversity, with its emphasis on supporting and assisting Māori students to experience success as Māori. In NZCER's national survey of secondary schools,[67] 60% of the teachers who took part in Te Kōtahitanga said it had changed their practice, leaving another 40% who presumably took part but made no changes. The national survey also identified a factor called "community input"[68] that was more strongly supported by teachers in schools with high numbers of Māori students on the roll, and Te Kōtahitanga was preferentially offered to such schools. Cross-tabulation of the "community input" factor with teachers' experiences of professional learning programmes revealed that teachers who took part in Te Kōtahitanga, and who said they had changed their thinking or practice as a result, were more likely to agree or strongly agree with the community input factor. One of the four items that made up this factor was "give students a voice in curriculum planning". While teachers' thinking will be influenced by a range of considerations, it is interesting that in-principle support for the idea of student involvement and input into curriculum planning is strongly linked with (self-reported) efforts to change practice.

Some online submissions from teachers and school leaders suggest that at least some schools with less cultural diversity are thinking about what "diversity" means in its broader sense, and how this applies for their learners as members not only of their local community but also as citizens of Aotearoa:

> Our school is 100% Pākehā, with no diversity in ethnicity. We have therefore worked had to encourage the acceptance of diversity in other ways. We celebrate and openly discuss the special skills, talents or challenges that we each have. We have children with Autism, Aspergers syndrome, ADHD, Dyslexia, Dyspraxia etc. We openly discuss the situation for each child and recognise that programmes,

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65 Hipkins et al. (2011).

66 Ministry of Education (2007a).

67 Hipkins (2010b).

68 This factor was made up of teachers' and school leaders' responses to four questions about how important they thought it was to: (1) Give students a voice in curriculum planning; (2) Seek Māori community input into the curriculum; (3) Seek parent input into curriculum; and (4) Seek community input into curriculum.

> expectations and routines will be different for different children. While many of these children have significant challenges, they also have significant skills that others do not.[69]
>
> We live by the phrase 'one size fits one'. We are always looking for ways we can celebrate each other's diverse strengths, whether they be a student, staff or community member. Our definition of 'achievement' is much wider than merely 'reading, writing and maths'. We value 'Māori-ness', even though we only have a school Māori population of 3%. We consider knowing about things Māori to be the right of every child living in NZ.[70]

How easily can schools forge connections to communities (and students)?

Finally, even schools that are committed to meeting the needs of all their students and wish to engage with their school community in order to achieve this may still experience considerable challenges in forging these connections. Schools may be hampered by a lack of clarity about the purposes of community engagement and what should ultimately be achieved.[71] One reason may be simply that, traditionally, students', parents' and communities' needs and views have not been central to professional discourses about curriculum and teaching, and so the question of how to incorporate these into shaping teaching and curriculum is genuinely challenging for people on both sides of the school walls.

Some schools that have embraced *NZC* are exercising considerable ingenuity in strengthening conversations with parents about their own child's learning. However, even if schools wish to have greater community engagement, parents and communities may seem unresponsive to efforts on schools' part to engage them.[72] There are many reasons why this might be the case, including a view amongst parents and communities that educational decisions are the professional domain of teachers and school leaders.

There is also the challenge of overcoming barriers to genuinely engaging and involving learners in shaping their own learning. This issue is addressed further in Section 6.

Summary: What is currently happening vs. what needs to happen

It seems that schools are currently seeing "diversity" in ways that are more consistent with the first of the two sets of ideas outlined at the beginning of this section: that is, that diversity means finding ways to help learners from nondominant social groups improve their engagement and success in education. The influence of certain key policies, strategies or initiatives on teacher talk and thinking is clearly evident in the various research studies described above: however, it is also clear that this talk and thought is still very much oriented towards acknowledging, celebrating and possibly understanding the diversity of "unlike others". Thus far we have not found research evidence about schools engaging with the second set of ideas—education *for* diversity (of people and ideas/knowledge).[73]

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69 Online submission by a primary school principal.

70 Online submission by a primary school principal.

71 Bull (2011), Hipkins et al. (2011).

72 See Bull (2011).

73 *NZC* draws on these ideas (in the principles and values sections, and in the Social Science learning area), but they are not explicitly referred to in the form described here.

5. A curriculum that uses knowledge to develop learning capacity

Why does this idea matter for the 21st century?

One of the biggest challenges for education in the 21st century is that our current ideas about curriculum are underpinned by two concurrent, but quite different, epistemologies, or models of what counts as knowledge: the "20th century" idea of knowledge as content or "stuff", and the 21st century view of it as something that *does* stuff. Philosophically speaking, this mixing together of quite different ideas about knowledge is a problem,[74] and understanding this issue is crucial for achieving a "21st century" view of curriculum. This is well illustrated by the two contrasting snapshots of practice in the boxes below.

A snapshot from practice[75]

We use an inquiry approach called Thinking-based Learning that explicitly teaches students how to think more skilfully while using this thinking to solve a real-world problem or as real a problem as the school's resourcing allows. This approach develops not only students' research skills but also their critical and creative thinking needed to be lifelong learners. The students are challenged in their thinking by a fertile question (Harpaz and Lefstein) which is open, undermining, rich, connected, charged and practical. During these units our teachers use techniques to make the students' thinking visible so it can be guided and challenged. At the start of a unit when disciplinary knowledge is weak the class may view, say, a DVD and discuss its content using the "Connect, Extend, Challenge" routine (Harvard's Project Zero). As the research progresses and disciplinary knowledge increases we move to Paideia Seminars (Adler) where a class sits in a circle and discusses their developing ideas around the fertile question and finally, as the unit ends, we move to a concluding conversation where a group of students presents their findings to their teaching team (four classes) and joins with the audience in a discussion on their new insights and understandings gained. Here we use the "Ladder of Feedback" (Perkins). These "Learning Conversations" support collaborative knowledge building and allow the teachers to guide and challenge their students' thinking as it becomes visible to the whole class. Our students work in collaborative pairs during a Thinking-based Learning unit.

A counterexample from practice[76]

The New Zealand Curriculum is a living and evolving document. I think that it fully supports teachers. However, on a classroom level, I look at and refer to it rarely. Our department curriculum is out of the dark ages, with fact-based learning, and ridiculous topic tests for juniors. The junior curriculum does not support lifelong learning apart from learning facts. The content is prescribed. Students are often not engaged. They have little opportunity to gain skills.

The first view of knowledge is reflected in the counterexample from practice in the second box. This is the "traditional" idea of knowledge as content, organised into curriculum according to disciplines. From this point of view, the learner's job is to absorb and assimilate that knowledge into their minds and demonstrate how well they have assimilated this knowledge through various means of assessment. Acquisition of knowledge becomes valuable for its own sake; even if the learner is not actually *doing* very much with the knowledge other than demonstrating that they have learned it. The underpinning assumption is that this knowledge will be stored up in preparation for later use during the learner's life. This message is often repeated to learners when they ask why they need to learn it. A host of other ideas has traditionally been bundled together with this traditional view of knowledge and its expression through the curriculum. One example is the idea that students' ability to learn this knowledge is a reliable sign of their intelligence and diligence. In the Industrial Age, when higher education (and even secondary education) was a limited resource available to a minority of students, the academic curriculum was a useful, and seemingly fair, tool for sorting students, according to how they achieved in assessments. Those who achieved highly were considered deserving of further educational

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74 Bolstad and Gilbert (2008).

75 Drawn from a submission from Birkdale Intermediate, which was also visited as part of this research.

76 Drawn from a secondary school science teacher's submission to this research.

investment—while those who did poorly were deemed to lack either the capacity or the determination to succeed as learners, and were thus funnelled towards more "vocational"/low-skilled workforce pathways. This approach was coherent with the ideas that underpinned Industrial Age societies, including how the workforce was structured, and even more tacit ideas about intelligence and ability as a "fixed" capacity.[77]

The second conception of knowledge is associated with the Knowledge Age/"21st century" discourse outlined in Section 2. In this view, knowledge is seen as more like a verb than a noun. Knowledge is about *creating* knowledge and *using* knowledge, and bringing it to bear to solve problems and find solutions to challenges as they arise on a "just-in-time" basis. These ideas about knowledge have largely emerged in the world outside education—driven in large part by economic, social and political changes, often facilitated by new technologies. As Section 2 outlined, the implications of these changes in ideas about knowledge are extremely important for thinking about the design of curriculum. In the latter part of the 20th century there were significant developments in views of what *purpose* a curriculum ought to serve. Rather than being seen predominantly as a tool for prescribing "things-to-be-learned", the idea of curriculum as a guide for shaping and developing learners' abilities and identities gained prominence.[78] This is reflected internationally in the UNESCO pillars of learning—learning to *know*, learning to *do*, learning *to live together* and learning to *be.* Important questions for curriculum development from this point of view are thus not only "*What knowledge* do students need to learn?", but also "What kind of people do we want New Zealanders to be? What kind of community would we like to live in? What sort of schooling could help us to be those kinds of people and have that kind of community?"

But where is knowledge in all of this? What does the 21st century view of knowledge mean for deciding what students need to learn, and how they need to learn it? The Knowledge Age discourse argues that reproducing existing knowledge can no longer be education's core goal, because (a) it is no longer possible to determine exactly which knowledge people will need to store up in order to use it in their lives after school, and (b) the "storing up for future use" model of knowledge is no longer useful or sufficient for thinking about how knowledge is developed and used in the 21st century. Rather, the focus needs to be on equipping people to *do things with knowledge*, to use knowledge in inventive ways, in new contexts and combinations. Rather than providing access to a fixed stock of knowledge, the task now is to equip people to enter and navigate the constantly shifting networks and flows of knowledge that are a feature of 21st century life.[79] An individual's stock of knowledge is important as a foundation for their personal cognitive development: however, for it to be useful as a foundation for their participation in social and economic life, the individual must be able to connect and collaborate with other individuals holding complementary knowledge and ideas. What this means for curriculum is a shift in what is "foregrounded". Instead of simply assuming these capacities will be developed through engagement with disciplinary knowledge (the traditional view), there is a shift to focusing on the development of *everyone's* capabilities to work with knowledge.[80]

Figure 3 below represents some of the ideas discussed above with two axes. The horizontal axis represents the two different views of knowledge, while the vertical axis represents two different views of the purposes for learning. In the upper diagram, the four quadrants show the "purpose" for a curriculum depending on which views are emphasised. The lower diagram maps various aspects of *NZC*[81] onto axes, showing that it reflects some aspects of all of these views. There are various ideas that *could* help to bridge the gap across the mixture of ideas about knowledge and learning that frame current practice, providing entry points for a much deeper and more transformative shift in educational practice

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77 For a much fuller account of these ideas, see Bolstad and Gilbert (2008), Gilbert (2005), Kress (2008).

78 Bolstad (2004), Reid (1987a, 1987b).

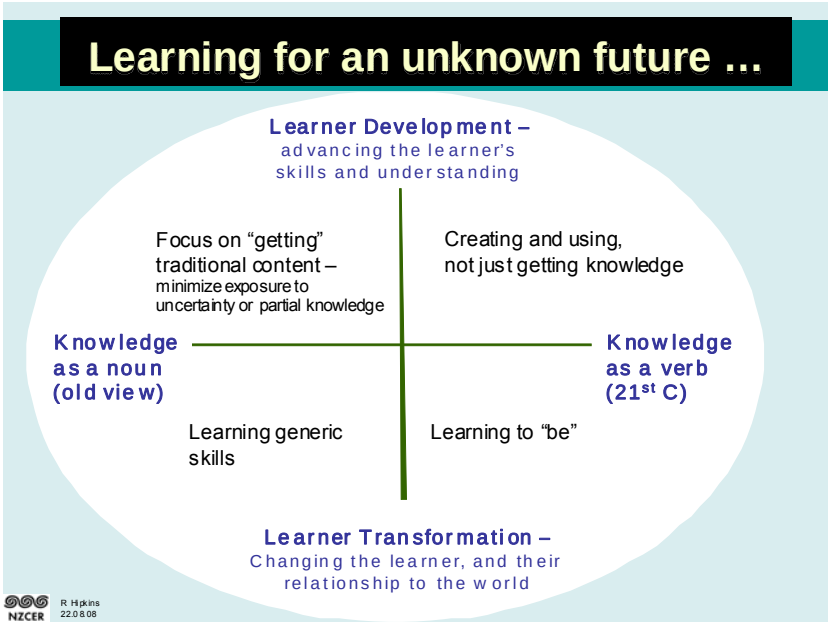
79 The idea of knowledge as a system of "networks and flows" is taken from Castells (2000).

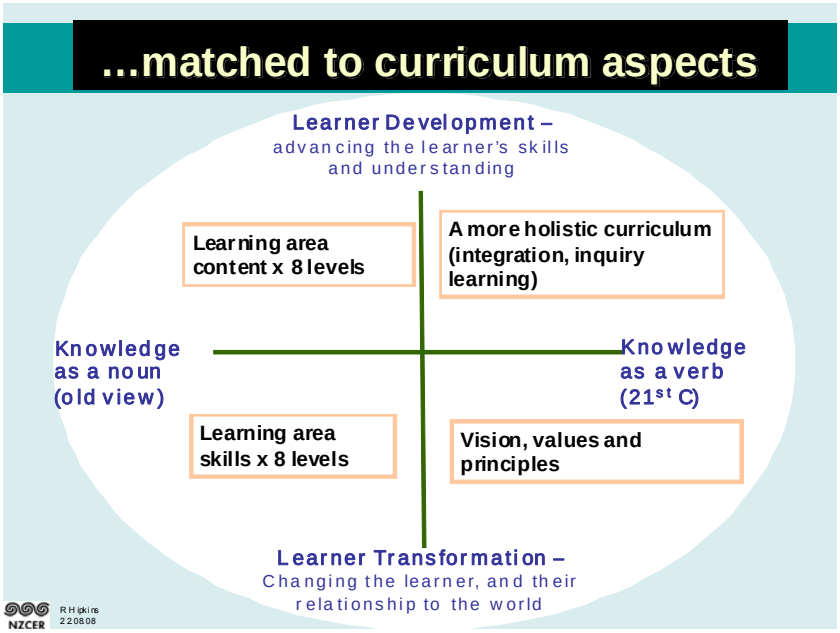
80 The approach described by the intermediate school in the first excerpt at the beginning of this section illustrates how this focus might play out in an actual teaching and learning situation.

81 Ministry of Education (2007b).

towards more 21st century approaches. However, as discussed next, there are a number of issues that make this difficult in practice.

Figure 3 ***Contrasting views of knowledge (and learning) in relation to curriculum***[82]





[82] Adapted by Rosemary Hipkins and Rachel Bolstad after Barnett (2004).

What are the issues for practice?

Finding coherence across ideas about curriculum and learning

Because practice in today's schools is underpinned by a mixture of ideas about knowledge and learning, it is not surprising that schools may pick up some ideas (e.g., the goal of "lifelong learning") while still retaining older ideas about knowledge and curriculum that don't really support this goal. Many of these older ideas are reinforced by structures and cultures within schooling, as well as at the system level. This means that potentially transformative 21st century ideas are often reinterpreted within more familiar/traditional frames, and as a result curriculum and teaching practices change relatively little.[83] However, research shows that some schools can develop more coherent approaches that open the opportunity for more significant shifts. One way this can occur is when high-level organising ideas support people to "see" curriculum, teaching and learning through a new lens. Several examples of ideas like this are outlined below.

Education for enterprise (E4E)

E4E's aim to develop people, schools and communities with "enterprising attributes" was a powerful, unifying idea for many schools in the E4E Regional Clusters Initiative. Developing "enterprising attributes"[84] focused schools' thinking on how to develop learners' *ways of being*. At the same time the E4E Regional Clusters Initiative also encouraged *schools* (and communities) to develop an "enterprising culture". The idea that *schools* could become more "enterprising" opened up the opportunity to re-examine many aspects of teaching, curriculum and other processes and practices across all aspects of school organisation, such as planning, visioning, documenting etc. These changes could be accompanied by structural shifts that might alter, for example, the ways that schools tend to divide up their timetables, learning areas, teaching staff or student year levels. The message that E4E was not a prescription or programme—but rather an idea or approach that schools and communities could develop and enact in their own ways—provided an open-ended opportunity for schools to interpret and shape curriculum learning experiences to support their ideas about being enterprising. The two-year evaluation of the E4E Regional Clusters Initiative[85] suggested that schools were developing "more" E4E projects involving "more" teachers and "more" students, and this expansion sometimes spurred small shifts in school organisation and structures. Schools, to varying degrees, had begun to make incremental changes to systems and documents that reached across the whole school and may well set the stage for more fundamental structural shifts in the future. It appeared that E4E had the potential to develop some of the transformational aspects of *NZC*.[86]

Education for sustainability (EfS)

Research shows that EfS can also provide a unifying framework for schools to draw together ideas about teaching, learning and curriculum, as well as the school's social and physical environment, and how the school functions at an operational level (including how power is shared, how decisions are made and the school's impact on the environment through resource consumption, waste generation etc.). An evaluation of three programmes to support EfS[87] found that professional development support was encouraging more transformative learning styles, greater student engagement and stronger school–community interactions. However, while there was some evidence of very good progress in these areas, it was not pervasive within or across all schools. One challenge was the difficulties for developing and integrating EfS

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83 This mirrors the "deep" versus "shallow" expressions of personalising learning discussed in Section 3.

84 These include attributes such as: generating, identifying and assessing opportunities; identifying, assessing and managing risks; collecting, organising and analysing information; generating and using creative ideas and processes; identifying, solving and preventing problems; identifying, recruiting and managing resources; matching personal goals and capabilities to an undertaking; working with others and in teams; being flexible and dealing with change; negotiating and influencing; using initiative and drive; monitoring and evaluating; communicating and receiving ideas and information; planning and organising; being fair and responsible. See http://education-for-enterprise.tki.org.nz/About-E4E/The-NZ-Curriculum-and-E4E/Enterprising-attributes.

85 Bolstad et al. (2010).

86 For example, the enterprising attributes can be aligned with key competencies.

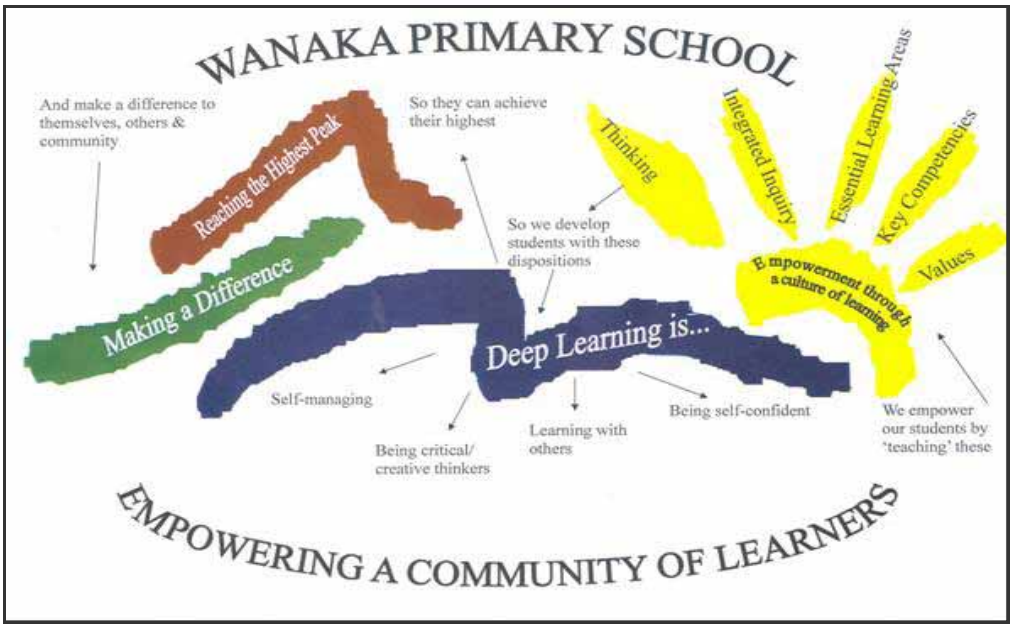
87 Eames, Roberts, Cooper and Hipkins (2010).

into secondary curriculum and teaching practices. A short-term solution offered by the evaluators was to support the development of secondary-specific resources to build teachers' understandings of EfS across and within secondary subject/discipline areas. In the longer term it was suggested that future developments across *all* the systems components of secondary education (policy, curriculum, pedagogy, assessment/qualification, school operations and community interactions) needed to be aligned to support EfS. It was also noted that the national and global significance of "sustainability" is rapidly evolving and developing across all sectors (including financial, governmental, legislatory and community and social sectors), and that EfS needs to stay connected with these emerging developments.

Key competencies, principles, values and other ideas from NZC

Other research projects show how key competencies, ideas about lifelong learning and other ideas from the front half of *NZC* can provide an entry point for coherence.[88] Ideas about developing "learning capacity" were often included in new school visions for learners, and/or visual metaphors designed to represent these ideas within the school, for teachers, learners and the community, such as the example shown below.

Figure 4 ***Wanaka Primary School's vision as a visual metaphor***[89]



Visual metaphors and visions such as the example above are valuable when they are understood and consistently expressed in everyday practice across all aspects of school life. For example, the development of Wanaka Primary School's vision was an important part of a self-review process for the school which helped them define who they were at a point in time.

The three "unifying" ideas discussed above—E4E, EfS and key competencies and other ideas from the front of *NZC*—usefully illustrate how schools can find coherence across ideas and practices. It is important to note that none of these ideas alone is sufficient. Rather, what is important is the coherence of thinking that they support (including how the ideas interact with each other). In many schools, *NZC* has been a catalyst for new conversations about learning. The challenge is ensuring that these ideas become embedded throughout the learning programme, including in teaching and learning associated with disciplinary knowledge. This has been an iterative work in progress for most of the schools involved in our studies.

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88 For example, Boyd et al. (2005), Boyd and Watson (2006), Hipkins et al. (2007), Hipkins et al. (2011).

89 See Hipkins et al. (2011).

Developing structures to support a knowledge-building curriculum

Albany Senior High School (ASHS) was founded with an explicit aim to offer a curriculum "for the 21st century". The school is organised around a carefully designed and evolving network structure which ensures every student actively plans and reflects on their learning progress with one teacher who knows them well. The timetable structure acknowledges the importance of this and makes space for both students and teachers to give it their serious attention, with two full periods per week. The whole day on Wednesday is devoted to an extended "impact inquiry" that gives every student the chance to pursue a piece of deep learning in an area that engages them personally. There is a focus on "learning to learn" in more traditional time spent in subject lessons as well. As in other schools that value this, the learning periods are longer than is traditional (120 minutes) to allow the time needed. The school has a focus on the importance of providing "learning stretch" for each student. However, the impact inquiries were too loose in their structure initially and some students floundered. The school learned that it needed a tight and well-defined process (but not so tight that it prevents students following their particular passion). Continued fine tuning has seen the impact inquiries become more aligned with the tutorial network structure so that the mentor teacher has a strong knowledge of both the inquiry and each student's progress in their other subjects.[90]

The ASHS example shows that creating structures that support a knowledge-building, "learning to learn" curriculum can be a challenge, even for a new school. However, even setting up enabling structures is not enough if their intentions are not understood and supported by the people involved. For example, schools that have experimented with innovative approaches to curriculum often struggle with the challenge of supporting more "independent" and self-managing styles of learning. Teachers do not always "see" that their role also needs to change to involve different types of interactions with students, different pedagogies and different forms of support and scaffolding for learning, and students may feel they aren't sufficiently scaffolded in their learning, when they have been accustomed to more traditional approaches. Research at Alfriston College highlights the considerable pedagogical shift teachers need to make to use extended learning time to develop students' learning capacity.[91] The theme of "changing the scripts" for learners and teachers is discussed in more detail in the next section.

The last two issues for practice may be the most difficult challenges to overcome in designing curriculum to develop learning capacity: rethinking the purpose of disciplinary knowledge, and rethinking assessment.

Rethinking the purpose of disciplinary knowledge

The counterexample from practice at the beginning of this section is a good illustration of this issue. Disciplinary knowledge, known in school education as "subjects", has formed the core of curriculum thinking for a very long time, particularly in secondary schooling. The Knowledge Age discourse does *not* suggest that disciplinary knowledge no longer matters. However, the reasons it matters are now very different. In a 21st century curriculum, traditional knowledge is the raw material for new knowledge creation. It is a resource for what the French philosopher of knowledge Jean-François Lyotard calls "performativity": the ability to take elements from one (old) knowledge system and put them together with elements from another to make new knowledge.[92] If they are to do this, learners need to know quite a lot about how a number of different old knowledge systems work (i.e., they need to know something about how scientists, historians, mathematicians and/or literary critics work, and how they go about creating new knowledge in their disciplines). They also need good skills in mediating, translating and moving between the different disciplines. In the Knowledge Age, this kind of systems or metalevel knowledge and the ability to move between disciplines is more important than just knowing the detailed facts of those disciplines. Thus 21st century learners need to be able to

90 Hipkins (2011).
91 Hipkins, Shanks and Denny (2008).
92 Lyotard (1984).

do more than just reproduce knowledge. They must be able to actively interact with it: to understand, critique, manipulate, create and transform it.[93]

The essence statements for the learning areas in *NZC* are a useful gesture in this direction. Setting out a high-level rationale for why each of the learning areas matters provides teachers with the opportunity to step back from the content of their subjects to think again about the purposes those disciplines serve in people's lives, in society and community. However, numerous research projects have shown that even a commitment to these "bigger picture" goals for learning in the discipline areas (e.g., believing that science knowledge is essential for people in their everyday lives, for example, to understand the basis of environmental issues, health issues and so on) does not mean that schools' curriculum and teaching approaches will support learners to engage with disciplinary knowledge in 21st century ways. The practice of breaking disciplinary knowledge down into topics, units and content to be learned is difficult to dislodge, particularly when reinforced by assessment approaches that are also founded on traditional ideas about learning as knowledge consumption/reproduction.

Rethinking assessment

It has long been recognised that aligning the "message systems" of schooling—curriculum, pedagogy and assessment—is critical.[94] Some New Zealand research suggests that when teachers see passing National Certificate of Educational Achievement (NCEA) standards as the main purpose for learning, they can think of learning-to-learn approaches as an abdication of their responsibility[95] to ensure students have the best chance possible to succeed in their assessments. On the other hand, research identifies many examples of teachers or whole schools moving towards a paradigm where the focus is on designing deep, relevant and "authentic" learning experiences, with assessment being used flexibly and tailored to the particular learning contexts. Teachers seem to have differing views about the extent to which current assessment approaches do or do not present barriers to curriculum innovation. While some see ways to develop future-oriented learning within and around existing assessment approaches, others may feel they are still constrained by a school-wide or system-wide culture of "inflexible" assessment.[96] As NZCER's national survey of secondary teachers[97] identified, combinations of contextual factors play a part in the barriers that teachers perceive: where they are in their careers; who they work with; the roles they hold; the subjects they teach; how well their school is resourced; and their school's structures and processes. All of these come together in different ways for different teachers.[98]

Summary: What is currently happening vs. what needs to happen

Some educationalists argue that 21st century schools should be sites of knowledge *production* rather than consumption.[99] In *Education and Mind in the Knowledge Age,* Carl Bereiter says that we need to restructure school activities to resemble the working of research groups, engaged in collaborative new knowledge building designed to solve real-world problems, although schools are not research organisations, and nor are they miniature enterprises.[100] Bereiter and other theorists use the idea of "knowledge creation" to mean something much more than learning, in the sense in which this term is used in schools. The knowledge they are talking about is something completely new,

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93 Bolstad and Gilbert (2008).

94 See, for example, Bernstein (1990).

95 Bolstad and Lin (2009), Hipkins et al. (2008).

96 See Bolstad et al. (2010).

97 Hipkins (2010a, 2010b).

98 In NZCER's national survey, teachers who were most positive about NCEA were also more likely to report that they had been involved in a comprehensive exploration of the various components of *NZC* and to have been acting on at least some of its new directions. They were less likely to see NCEA as a barrier to curriculum change and they tended to hold more positive views of today's students and their engagement in learning. They were also likely to be more positive about their own professional learning, and about the collaborative learning possibilities they experienced in interactions with their peers. They were more likely to be welcoming of community participation in determining curriculum and learning directions for the school (Hipkins, 2010a).

99 Bigum (2003).

100 Bereiter (2002).

something that, while it can contribute to an individual's learning, also contributes to world knowledge. This knowledge creation doesn't take place just in the minds of individuals, but in the relationships and connections between people, between people and ideas and between people and existing knowledge as well.

What seems clear from all this is that if we think 21st century schooling's major focus should be to build learning *capacity* (or "learning power" as Guy Claxton puts it),[101] and, following from this, that disciplinary knowledge should be seen, not as an end in itself, but as a *context* within which students' learning capacity can be developed, then this focus needs to be made clearer in *NZC* and teachers need support to understand this new emphasis. While the use of the term "learning areas" in the *NZC* document signals this, it is clear that this has not changed educators' underlying thinking. Part of the meaning of the term "21st century learning" is this paradigm shift in the meaning of such apparently common-sense terms as "knowledge" and "learning": it seems clear that the work of building a 21st century education system must involve supporting educators to understand this shift.

Related to this "21st century learning" is also a shift in our understandings of what schools are *for* and our understandings of the roles and responsibilities of teachers and students. These issues are explored in the next section.

[101] Claxton (2002a, 2002b).

6. "Changing the script": Rethinking learners' and teachers' roles

Why does this idea matter for the 21st century?

Just as curriculum needs to be reconceived in ways that reflect 21st century ideas about knowledge and learning, there also needs to be shifts in the "traditional" roles or "scripts" followed by learners and teachers. If we believe that the main role of education is not just to *transmit* knowledge but also to cultivate people's ability to engage with and *generate* knowledge, then teachers' roles need to be reconsidered. Similarly, if we no longer think the learner's main job is to absorb and store up knowledge to use in the future, then the learner's roles and responsibilities also need to be reconsidered. As outlined in previous sections, the 21st century learning literature calls for a focus on recognising and working with learners' strengths to support the development of every learner's potential. As discussed in the "issues for practice" section below, this can open space for both learners and teachers to see what learners are capable of—often to the surprise of both. These ideas contrast with practices that support deficit thinking, or the notion that learners' level of intelligence or ability is "fixed" and cannot be expanded and developed with adequate learning support.

The three snapshots below suggest that the idea of changing the scripts for learners and teachers has some traction amongst educators, even when the shifts they aspire to have yet to be realised in practice (as in the case of example 2).

Snapshots from practice

Example 1[102]

> *I am no longer a teacher, I am a facilitator. I help students on their journey. I do not create their journey, I guide them on their path. I am here for them if they need me. I sit among them instead of being at the front of the class. As the students study in groups (collaborative learning) a topic they are interested in, they become our experts in the class, they become the teachers of the other students and of me as well.*

Example 2[103]

> *Currently I am 'teacher at the front'. After 5 years, I have formed a traditional, teacher-centred role. This works well. It is easy for me; the students have become used to this habit of being fed knowledge. My future focus is to change this and become the manager/facilitator of learning, instead of font of knowledge. I will maintain order and discipline and safety, but the teams will control themselves.*

Example 3[104]

> *We are a new school that opened in February so we have had the chance to think big and be brave about what a school looks like and the role of teachers and learners in it. We have unpacked each of our vision principles with staff and are identifying what this looks like in the learning hubs. By opening a school with open learning spaces/a modern learning environment with two or three teachers in a space we are challenging teachers' notions of their 'ownership of a space' and of a set of children. We see the learning hub as a learner's space rather than as a teacher's space. We are working towards (we've been open 9 months!) ensuring the locus of control is firmly with the students rather than seeing the teacher as the 'authority' figure. Teachers are open and transparent as modelling themselves as learners. We don't have a fluffy notion of what teachers do—we are not talking about facilitators, guides on the side, and so we are quite purposeful around our educative purpose of causing learning and the fact that we are here to serve our learners.*

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[102] Drawn from a secondary teacher's submission to this research.

[103] Drawn from a secondary teacher's submission to this research.

[104] A submission from Stonefields School, which was also visited as a case study as part of this research (further information from this school is included in the next section).

Why put learners and learning at the core of educational practice?

Twenty-first century educational theorists have argued that "the focus of schooling must change so that the learner and their transformative engagement with the world is at the centre of educational attention".[105] It may seem strange to argue that schooling needs to put learning at the centre of practice—isn't this what schools are for? However, as previous sections have illustrated, schooling has inherited a range of practices and beliefs that are derived, not from what is known about learning, but from a range of other historical and philosophical bases.

There are at least three significant aspects to the argument for putting learners' "transformative engagement with the world" at the centre of educational thinking and practice. First, there is the idea that the *learner* ought to be transformed through their learning. This reflects the 21st century concept of learning as building the capacities of the learner, learning *to be*, etc. Second, there is the idea that the world can be transformed *by* the learner. This reflects the 21st century concept of learners being engaged in knowledge-generating learning opportunities that support them to have an impact on some aspect of their world in the process of their learning (rather than undertaking contrived learning activities designed to help them learn and store knowledge for future use). Finally, there is the idea that the principles or concepts that are applied through the learner's engagement with the world can themselves be expanded and transformed through the learning process. This final idea suggests that our understandings about what is meaningful learning for a changing world—and how to support it—will never be fixed and final, but will change and develop over time. This connects to the idea of schools as "learning organisations", where all the actors within the system (learners, teachers, school leaders, families and communities), and the system itself, continuously "learn" from this close focus on learning. The implications for teachers and educational leaders in the 21st century are discussed in the next section.

What are the issues for practice?

Confusion about the purposes of sharing power with learners

The idea of changing the scripts for learners and teachers is often shorthanded with phrases such as "student-centred pedagogies" or "student voice", alluding to the need to engage learners (and their interests, experiences and knowledge) in many decisions about their learning. However, the idea of sharing power with learners can be met with resistance, particularly if this is interpreted as an "anything goes" approach in which learners are given *complete* freedom to set the direction for their learning.[106] Consider this finding from a 2009 National Survey of Secondary Schools:[107] When presented with the statement "there is too much emphasis on 'student voice' and similar ideas nowadays", secondary teachers were almost divided in thirds: 26% agreed or strongly agreed; 34% were unsure; and 39% disagreed or strongly disagreed. Given the range of different ideas that tend to get lumped together under the rubric of

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[105] Kress (2008).

[106] Research on the early years of the Tech Angels initiative at Wellington Girls' High School provides an interesting perspective on this issue. As part of Tech Angels, students were teaching their teachers how to do things with ICT, but the reversal of the "normal" roles of teacher and learner seemed to be interpreted in two different ways. The first view is that the role reversal was primarily for the benefit of students, and that their expertise was limited to a narrow domain (ICT) and in all other respects teachers were still the more knowledgeable ones. Another interpretation was to see the two-way benefits for teachers and learners of this role reversal, including the opportunity for more co-learning and shared responsibility for learning between teacher and learner. This interpretation seemed to be less common among teachers but some of the Tech Angels saw things this way, and talked about the possibility of teachers and students using their respective expertise to collaborate together on projects in the future (see Bolstad & Gilbert, 2006).

[107] Hipkins (2010b, p. 89).

"student voice",[108] it is not surprising that teachers had such divergent opinions. A significant question for many educators is where knowledge fits into the picture. Some teachers are concerned that "student-centred" teaching or curriculum could be interpreted to mean that learning be initiated and driven *only* by students' existing knowledge or interests, which will of course be limited by students' life experiences and access to knowledge.

Student opportunities to lead and contribute are more likely to be co-curricular than curricular

Survey data from almost 4,000 Year 9 students, 1,350 teachers and 123 principals from 146 New Zealand schools, gathered as part of the international civics and citizenship education study (ICCS), suggest that students' opportunities to lead and have input into shaping school life tend to occur most often in co-curricular (sporting and cultural) activities,[109] or via mechanisms such as student council, and less often in classrooms. Although teachers and students consider their classrooms to be places where multiple opinions and viewpoints can be comfortably accommodated, on the whole, students' opportunities to contribute to decision making both in the classroom and at the level of the whole school, were fairly limited. Most schools had some form of student representation with students able to elect peers on school councils or boards of trustees. However, staff and students were likely to view differently the extent to which student opinion is taken into account, with students less likely than staff to think that students had an influence. Interestingly, students nevertheless held an optimistic view about the value and potential of student participation and input, with more than 85% agreeing or strongly agreeing with statements such as "lots of positive change can happen in schools when students work together", "student participation in how schools are run can make schools better" and "organising groups of students to express their opinions could help solve problems in schools".

Data such as the ICCS findings suggest that students' opportunities to have input may be circumscribed by tacit beliefs about what they can or cannot offer. Research on the Tech Angels initiative at Wellington Girls' College[110] provides an interesting perspective. As it was originally conceived, this initiative involved a role reversal with students providing a teaching and mentoring service to help their teachers learn how to do things with ICT. Our research uncovered different views on the benefits of the initiative, particularly among teachers. For example, some teachers tended to see role reversal as primarily for the benefit of students, because it gave them opportunities to experience leadership and develop confidence doing something new and out of the ordinary. Students' expertise was seen as limited to a narrow domain (ICT) and in all other respects teachers were still the more knowledgeable ones. Some of these teachers thought the Tech Angels would eventually "do themselves out of a job", because the student mentoring would no longer serve a purpose once teachers no longer needed ICT coaching. A different interpretation is to see the two-way benefits of this role reversal, including the opportunity for more co-learning and shared responsibility for learning between teacher and learner. This interpretation seemed to be less common among teachers but some of the Tech Angels (students) could see things this way, and imagined a future scenario in which teachers and students might collaborate together on a project where their complementary knowledge could be brought together to generate something new.

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[108] Hipkins (2010) notes that student voice could be underpinned by any of the following pedagogical theories:

- constructivist learning theories, which argue that students actively build their own meanings from their learning experiences, and that teachers need to hear students "voice" their own views on their learning in order for teachers to identify and support next learning steps
- inquiry learning approaches, where the "voice" of students is elicited to identify and pursue questions that interest them and, at best, link meaningfully to their lives beyond school
- goals related to the development of students' leadership skills by incorporating student "voices" in forums for decision making on various school matters
- psychological theories of personal development, where students are encouraged to express their "voice" in order to increase their self-awareness and ability to regulate their own behaviour and thinking
- goals related to responding to diversity in the classroom, acknowledging the rights of all students to be engaged by and have a voice in their learning, regardless of their different individual starting points, any special learning needs and different "world views" associated with the students' different backgrounds, cultures and experiences.

[109] Bolstad (2012).

[110] Bolstad and Gilbert (2006).

Creating an environment for collaborative knowledge building

The challenge is to move past seeing learning in terms of being "student-centred" or "teacher-driven", and instead to think about how learners and teachers would work together in a "knowledge-building" learning environment. This is not about teachers ceding all the power and responsibility to students, or students and teachers being "equal" as learners. Rather, it is about structuring roles and relationships in ways that draw on the strengths and knowledge of each in order to best support learning. For example, research in primary schools that were early adopters of ideas around the key competencies[111] (KCs) found that exploring the KCs was moving schools from content-focused topic learning towards integrated approaches. Increasing emphasis was being placed on students developing learning dispositions and a wider range of skills and competencies, and the schools were moving further towards pedagogies of co-construction. Professional development (PD) experiences were important for teachers to be comfortable with this. For example, at most of the schools teachers individually or jointly devised learning activities to support students to unpack the KCs and to work with their teachers to develop school views about the KCs. The successes and challenges of these experiences were then discussed at PD sessions. Many staff commented on co-constructing meanings for the KCs with students as a key shift in practice, contrasting this with their prior approaches to the "essential skills" which were, on the whole, completely invisible to students. In their view, the development of a shared language supported students to develop an understanding of the KCs, increased students' awareness of the need to consider the process of learning and not just content outcomes, and assisted students and teachers to set learning goals and success criteria for the KCs. All of these supported students to self-assess and recognise their strengths and weaknesses.

Research in secondary schools experimenting with curriculum innovations also highlights examples of teachers and students experiencing new roles. For example, survey data from the evaluation of the E4E Regional Clusters Initiative[112] showed that students were much more likely to indicate they had significant input into decision making about their work in E4E learning compared with other learning. Students perceived their teachers to be more like a guide than a teacher, and to spend more time working with individuals and less time teaching to the whole class. Many teachers also perceived their roles to be different compared with "normal" practice, seeing themselves as more of a guide/facilitator/mentor, and feeling they were more able to follow up on unexpected/unplanned opportunities to support students' learning. In case study interviews, some teachers commented specifically on the challenges of learning how to step back to allow students room to try their ideas and even experience failures and changes of direction as part of the learning process, rather than exerting control or intervening to prevent students from going off-track. The time required and complexity of managing more open-ended emergent projects was also a challenge. Teachers and learners sometimes faced significant logistical hurdles as they tried to carry out their learning work in different spaces within and outside their schools, or in collaboration with other people from outside the school (this is discussed further in Section 8).

Both the E4E evaluation and an earlier evaluation of curriculum innovation projects (CIP) in secondary schools identified examples of these approaches having benefits for students who were considered "low achievers". Creating conditions for students to identify and work with their own strengths and interests, and to use these in the context of a learning project that was meaningful to them (and sometimes to others; for example, people or groups in their community), enabled some students to "shine", showing a wider range of skills and competencies than they had previously.[113]

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111 Boyd and Watson (2006).

112 Bolstad et al. (2010).

113 See Bolstad et al. (2010), Boyd et al. (2005).

Influencing whole-school culture and sustaining innovations over time

The recent CIES[114] found that *NZC* was a catalyst for conversations about the role of teachers, learners and the community in setting directions and roles, and that co-construction of curriculum and teaching with all groups became more prevalent. Many schools in the studies were attempting to move from fixed content-driven models of curriculum delivery. The focus on collaborative knowledge building was supported by prior and current PD initiatives, including ICT Professional Development Clusters (ICTPD), Assess to Learn (AtoL), Principals' Professional Leadership Groups (PPLG), the Ariki project and Literacy Professional Development Programme (LDPD). In several schools, new thinking about the intent of the curriculum was characterised as moving the content focus from "what" to include the "how" and "why" of learning. In one area school this change was described as a "paradigm shift" in teachers' understanding, with a related shift from teaching *contexts*, to teaching for the development of *big ideas* and important *concepts*.

Summary: What is currently happening vs. what needs to happen

While the studies discussed in this section provide evidence of teachers and students experiencing learning benefits from shifting their roles and working in more "21st century" "knowledge-building" ways, it is important not to overestimate the profundity or permanence of these shifts in terms of teachers' future practice, or their practice across different classes and year levels they may teach. These and other studies of innovative curriculum and teaching show that the innovative practices occur in "pockets" within a school and are not necessarily representative of the general patterns of teaching and learning across a school. Long-term, system-wide change is extremely difficult. It requires a culture shift: a new environment in which the majority of teachers think in new ways, develop new skills and have new understandings of themselves as professionals.

The demand for teachers and educational leaders to develop new knowledge, attributes and capabilities to support education in the Knowledge Age is discussed in the next section, while the challenges of scaling up and sustaining innovation are discussed in Section 10.

[114] Cowie and Hipkins (2009), Hipkins et al. (2011).

7. A culture of continuous learning for teachers and educational leaders

Why does this idea matter for the 21st century?

Most adults today have been socialised into various educational ideas and practices that were implicit to the 20th century education systems that they experienced. It is argued that educators (not to mention the wider public) will need to re-examine many implicit and taken-for-granted assumptions about teaching and learning, since future-focused practice will require teachers to work in ways that are very different from the models they experienced during their own years of school.

In an environment where there is a need for ongoing professional learning and growth amongst teachers, the demands of educational leadership have also changed. Schools are being talked about as "learning organisations", and educators are encouraged to become "professional learning communities" or even "networked learning communities" within and across schools. School leaders have responsibility for supporting and sustaining a continuous culture of learning amongst staff, in a dynamic environment.

At the system level, the same demands also apply to those responsible for shaping educational policy and infrastructure, and various stakeholder groups that support and contribute to the educational system. New Zealand's participation in the Global Educational Leaders Programme (GELP) is illustrative of this. The initiative aims to "support education system leaders with their personal development and transformational leadership as they work to transform education at local, national and global levels".[115] GELP's guiding principles mirror the kinds of approaches that it is argued school leaders and teachers need to undertake, including the need to *work together* to develop the change agenda and practices, develop "next practice" and collaborative problem solving and develop new capabilities while implementing and achieving change.

A snapshot from practice[116]

Stonefields School, a new school opened in 2011, is staffed by teachers and leaders who are willing to question all the "conventional" practices that happen in a primary school and to think about whether they are necessary, and how (if at all) they support the school's central goal of supporting learning. For example, why do we have school bells? Why do we have assemblies? How do these support learning? Do we need a dedicated school library? Why? As the principal states, the purpose for raising these questions is that "We want coherence—[to ensure] that what we espouse aligns with the rubber hitting the road." Staff are encouraged to "let the incongruencies bubble up" so that every aspect can be considered and discussed in relation to the school's learning intentions.

One of the school's many interesting features is the physical structuring of three learning "hubs"—multifunctional learning spaces that belong to groupings of students in mixed year levels (Years 0–2, 3–4 and 5–8) supported by two to three teachers per hub who share responsibility for all the learners in the hub. Another is the school's four vision principles for learning: building learning capacity; collaborating; making meaning; and breaking through. Evolving practices to fit with the intentions of the learning hub and vision principles has already involved a great deal of learning and thinking, but the principal and senior leaders openly discussed their "next wonderings" during our case study visit. These include: How are we creatively showing growth in students' conceptual understandings? How do you find rich ways of showing growth? How can there be more interactions across the different hubs? What learning matters and how are we developing it? Where does the balance lie between student-led learning and providing basic concepts? Does developing "dispositions" for learning really set students up for success and do students apply them/transfer this learning? What about college? How do we bring in the community and take students out to the community?

The idea of putting students/learning at the centre of all decisions recurred throughout our interviews with staff. Staff talked about themselves as a bit like "bungy jumpers", willing to try new things and take risks. Amongst other things, they also felt they needed to be flexible, honest, have a high degree of belief and trust in themselves and one another, and (this was underscored), a genuine like of children and a commitment to putting students' learning at the centre of all practice.

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[115] See www.cisco.com/web/about/citizenship/socio-economic/docs/gelp_broch.pdf

[116] Stonefields School was visited as a case study to inform this research.

What are the issues for practice?

In a knowledge-building learning environment, what knowledge do teachers need?

It is obvious from previous sections that teachers need to know a great deal about learning; how it happens, how to support it and what kinds of learning matter (see Table 3, Section 2). But what about the "subject" or "disciplinary" knowledge that has long been the cornerstone of teachers' professional knowledge? How, if at all, is 21st century disciplinary knowledge different from the past, and what are the implications for professional learning?

Throughout this synthesis we have reiterated the knowledge society literature's advocacy of teaching *with* knowledge, as opposed to teaching knowledge as an end in itself (or to be stored up for future use). However, many teachers, particularly in secondary contexts, will find it difficult to imagine what teaching *with* and *through* disciplinary knowledge to achieve transformative learning might look like. Many researchers argue that 21st century teachers actually need to know *more* in terms of their disciplines, not less, but that this knowledge needs to be more focused at the systems-level in order to allow teachers to support students to learn in more open-ended knowledge-building ways. It has been argued that, while 21st century teachers need to be able to think about knowledge as a tool to do things with (not an object to be mastered), much current teacher PD aims to add to the store of *what* teachers know, as opposed to helping them explore *how* they know.[117]

Research in the classrooms of New Zealand teachers who were awarded literacy e-fellowships[118] showed that part of what allowed teachers to engage students in innovative multimodal literacy practices[119] while still planning and managing for clear learning outcomes, was teachers' deep disciplinary knowledge, acquired through tertiary-level qualifications or through sustained participation in discourse communities associated with their discipline. All of the e-fellows had interest and expertise in their project topics that went back many years. Some had completed university study or specialised in these areas as part of their teacher training, and had been involved in ongoing PD in the area. The e-learning fellowships provided teachers with release time from the classroom for planning, reading, researching, conversing with and observing other teachers, and reflecting and developing e-portfolios. It also provided the fellows time and space to meet together as a professional learning community. The research concluded that scaling up the kinds of innovations the e-fellows were developing would likely require the presence of these conditions, especially those that support teachers to build deep disciplinary knowledge.

How do teachers' individual learning dispositions interact with the school as a professional learning environment?

Twenty-first century educational thinking requires teachers (as well as students) to see themselves as lifelong learners, able to adapt to changing educational circumstances and changing groups and needs of students. The CIES studies[120] investigated a number of *NZC* explorations designed to encourage teacher inquiry into practice (on their own, and with others in learning communities). The teachers involved in these studies commented that to function in this way, teachers needed to develop key competencies in themselves. The CIES researchers concluded that:

> there is considerable evidence to suggest that schools have moved some distance … in developing and enacting one or more approaches to teaching as inquiry. As with many other aspects of NZC, the curriculum document itself is not the sole catalyst of these initiatives. Many of the teaching as inquiry approaches we heard about were adopted or adapted from prior professional learning contracts.[121]

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117 Bull (2009).

118 McDowall (2011).

119 For example, in these projects primary students took on roles as authors, editors, bloggers, critics, script-writers, sound engineers, actors, illustrators and more, collaborating to generate multimodal texts and develop a metaknowledge understanding of meaning making and how it can be constructed and interpreted through different forms of text.

120 Cowie and Hipkins (2009), Hipkins et al. (2011).

121 Hipkins et al. (2011, p. 58).

In other words, the school's professional learning cultures and access to professional learning support mattered. As one teacher stated:

> I consider the school culture promotes teachers as learners and the school culture lets you feel you are contributing, not threatened.[122]

The NZCER project *Teachers' Work* set out to explore the question, "What dispositions/skills/ knowledge/attributes do teachers need now and in the future to successfully work with all learners in an increasingly complex, connected and fast-changing world?" While the initial focus was on the individual teachers' qualities (in particular, their sense-making systems), in the third phase of the project, the researchers were struck by the differences in the contexts their teacher participants were working in. They argue that the learning environments they observed seemed to be the result of an interplay between individual teachers' knowledge/skills/dispositions (which varied greatly) and the context within which they were working (the students, the school context/organisation and so on).[123] They conclude that, while 21st century schooling needs a highly educated workforce, this challenge is matched, if not exceeded, by the challenge of providing organisational structures and systems that can adequately support educators' ongoing professional learning needs.[124]

The Inservice Teacher Education Practice (INSTEP) project represented one example of an effort to promote a strategic and coherent focus across the system in the area of inservice teacher learning. In an evaluation of INSTEP,[125] participants commended the project's goals of "bringing together practitioners from across the sector to work collaboratively to examine, inquire, and build knowledge". INSTEP provided opportunities for inservice teacher educators (ISTEs) to examine their own theories of learning, deprivatise practices they had evolved over years and trial alternative approaches to develop deeper understandings of how to engage teachers and school leaders in professional learning. The evaluators reported that the adoption of a research and development (R&D) approach over 3 years and investing in understanding ISTE practice in great depth had contributed significantly to the knowledge base around this area, and this was seen as an acknowledgement of the importance of inservice teacher education as a lever for change.

Future-oriented educational leadership requires more complex skills and capacities

The CIES findings, and those from similar research,[126] suggest that transformational change requires different forms and types of change management and leadership at different times. Different types of leadership and different leadership models are needed so that the system can learn from what works when, and know when it is necessary to switch approaches and start building capacity in different ways. Future-oriented school leaders need to be strategic systems thinkers and change facilitators who are able to lead leaders and cultivate distributed leadership amongst their staff. To be such a leader requires a complex skill set—this has obvious implications for the PD of school leadership teams—for the newer members *and* the more experienced "old hands".

Collaborative and networked learning; but with whom and for what purpose?

Educators have long shared knowledge through professional networks (for example, subject associations). Collaboration and networking to support future-oriented learning may involve greater collaboration across disciplinary areas, as well as new kinds of mentoring and learning relationships amongst educators and educational leaders. Collaborations between schools, policy makers and researchers have also proved useful in supporting emerging 21st century practice and enabling system-level learning. For example, clusters of schools in two curriculum innovation

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122 Hipkins et al. (2011, p. 59).

123 See Bull (2009).

124 See also Resnick (2010).

125 Sankar (2009, p. 3).

126 See, for example, Degenhardt and Duignan (2010).

research projects worked together to build practice through a series of workshops which included sharing of school practices as well as input from policy and research. These learning communities were a valued source of ideas and challenges for school leaders, lead teachers, researchers and policy makers.[127]

Several of the teachers and school leaders who made submissions about their future-focused practices for this research wanted to have contact with each other for the purposes of continuing and extending the "leading edge" of their own thinking and practices. Some expressed a feeling of "loneliness" as individuals or schools doing things differently. They were keen to be involved in networks and relationships that would enable their ideas to be pushed further by others who have been thinking along similar lines. Some already had these, but others didn't—and wanted them. Several schools had established networks with other "future-focused" and innovative schools/educators both in New Zealand and internationally for this purpose.

However, it is important to note that networking and collaboration *in themselves* do not necessarily support the emergence of future-focused learning practice. Nor are all networks and collaborations necessarily focused around *learning* (whether students' or teachers'); they may have other goals, ranging from school improvement to resource sharing. As Muijs, West and Ainscow[128] note, some network activities are essentially short-term "fixes", aimed at immediate issues of concern, while others are intended to bring about much more fundamental changes which may take several years to achieve. Muijs et al. suggest that we need to move beyond seeing networking "as a 'good thing' in itself or at best as potentially leading to rather nebulous 'learning communities'". They identify a substantive theoretical base for thinking about networking (largely from outside education), which could inform and deepen our understanding of educational networks and collaborations and how they are best developed and maintained so that they serve the purposes we want them to serve.

Summary: What is currently happening vs. what needs to happen

At the outset of this report we outlined the argument that there is no "model" for future teaching and learning practice waiting out there to be found, described and replicated/scaled up across the system. Rather, the kinds of changes that are needed will depend on the whole system becoming much better at learning and co-constructing ideas and practices. This will involve much greater attention to teachers' learning and development needs, supported by future-oriented educational leadership, networking and collaboration to share and build knowledge about how to support future-oriented *teacher learning* across the system.

[127] Boyd et al. (2005), Boyd and Watson (2006).

[128] Muijs, West and Ainscow (2010, pp. 7–8).

8. New kinds of partnerships and relationships: Schools no longer siloed from the community

Why does this idea matter for the 21st century?

Greater "connectedness" between schools and other organisations, groups and individuals in the wider community is a key part of 21st century education. There are two quite different reasons for this. The first reason is that schools, as they are currently set up, simply do not have the resources to provide "in house" all of the very different kinds of expertise needed to develop 21st century learning experiences for their students.

The 21st century learning literature argues that today's students need to engage in knowledge-generating activities in authentic contexts. However, in most formal contemporary learning situations, the "messiness" of real-world situations is simplified in the development of contrived learning tasks where the answers and outcomes are already known to the teacher. There is ample research evidence to show that even young children can engage in knowledge-generating learning, shaping new ideas and acting on their environment given the appropriate resources and learning supports. But providing for this in everyday educational situations requires additional resources/support/expertise/input from a much wider range of people than has been the case in the past. Teachers will still be important, and require strong pedagogical knowledge, but they will also need to be able to collaborate with other people who can provide specific kinds of expertise, knowledge or access to learning opportunities in community contexts. Systems and structures must also be developed in ways that enable, rather than constrain, community connections.

The second reason why better school–community connections are an important precondition for future-oriented learning is that real community understanding of and support for future-oriented educational ideas education is required if schools are to achieve the required shift in focus. This is more than just a "buy-in" argument. Public education is a collective good. It is supposed to meet current individual and social needs, but to also take a "long view"—to put in place structures and systems that provide for the long-term greater good—by developing our collective capacity. To work, this requires the support of the public—who are both its funders (via taxes) and its consumers. For this reason, developing the public's understanding of and engagement with future-oriented learning must be part of the public education system's function. For this reason, better school–community connections now really matter.

Snapshots from practice

Example 1[129]

The curriculum has allowed the students to focus their time on inquiry. With this comes a shift in focus towards them being curious about their world and understanding that they have the ability to go out and ask questions and find answers as a way of living their lives. This focus in school will hopefully enable the students to have a new-found understanding of how they can interact with their world. I believe that this view also breaks down students' understanding of what a classroom looks like and is hopefully breaking down barriers between school and the community.

[129] Drawn from an intermediate school teacher's submission to this research.

Example 2[130]

On Wednesdays, the timetable is suspended and students undertake impact studies of their own choosing.131 Working individually or in groups they plan and carry out an extended project that links to some specified aspect of the curriculum but typically extends well beyond what could be offered in any one class. This is seen as an important opportunity to grant greater agency and autonomy to students via the curriculum they experience at school. Each student liaises with a specified adult, chosen for their ability to support the intended learning. For example, an IT project would likely be supported by one of the IT teachers. Parents or mentors from the school's wider community are invited to support impact projects where they are willing and have the relevant expertise.

What are the issues for practice?

The everyday challenges of creating and sustaining partnerships beyond the school walls

The challenges for schools in forging connections with "the community" were discussed in Section 4, particularly in terms of parents and families. In contemporary discussions, "community engagement" usually means attempting to engage specific communities or social groups in working with schools to achieve mainstream 20th century education goals—such as improved levels of basic literacy and numeracy for all. In the 21st century learning literature, the purpose of engaging "the community" is quite different. The goal is to use the community to support the development of authentic knowledge-building activities for learners, and to provide authentic feedback on this knowledge when it is ready to be offered back into the community.

Currently, most school–community relationships are designed to support extracurricular and co-curricular activities—for example, parent involvement in school camps, fairs or cultural performances, students participating in a community-organised event (for example, litter clean-up days) or businesses providing sponsorship for particular school events, activities or resource materials. However, there are also many other ways in which schools can and do engage with people and groups from businesses and the community in more intensive ways to support curricular learning. Examples include:

- relationships with businesses and education/training organisations through initiatives like STAR, Gateway and other work experience programmes, which enable students to experience different work and training possibilities and gain qualifications linked to these pathways
- community-oriented initiatives like Home–School Partnerships, which emphasise engagement of families and whānau to support their students' learning, or to shape school curriculum to meet local needs and aspirations
- whole-school and whole-community-oriented initiatives like Enviroschools, or activities associated with EfS, which promote student and teacher engagement with local community issues, often involving significant community partners such as local and regional councils, groups and businesses associated with environment and sustainability
- partnerships between schools set up to help schools provide specialised knowledge or expertise—the various partnerships with Crown Research Institutes or university-based science centres or those with iwi, for example.

While each of these projects, initiatives and approaches has its own particular emphases and ways of working, all have the potential to shift the status quo with respect to school–business–community relationships and students' experiences of learning at school in relation to the world outside and beyond school. The E4E Regional Clusters Initiative provides

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[130] An example from Albany Senior High School, described in Hipkins (2011).

[131] Impact inquiries are called that because they are expected to make an impact that matters in some way to the school or local community. These are described in detail in Hipkins (2011, pp. 23–30).

one model of an approach to support closer engagements between schools and partners from the community and business sectors. Although E4E could be interpreted and expressed in a variety of ways, it commonly involved teachers and students working with partner(s) from business or community groups on projects which involved students generating something "new"—whether in the form of ideas, designs, products, services or resources—that showcased what students' had learned while also providing something useful for the partner or client they were working with.[132]

Schools in the E4E Regional Clusters Initiative encountered a range of challenges in seeking and maintaining partnerships to support students' learning activities. These included making the connections in the first place (this happened in different ways, including through teachers' personal networks, or via the E4E regional co-ordinator[133]), and sustaining the connections beyond the short term (there was some evidence of longer term relationships but these were seen by schools and partners as taking time and commitment to develop. Furthermore, collaborations were often dependent on key individuals within the school and/or business or community group. The working relationships were at the personal level rather than at the organisational level which posed continuity challenge when these individuals moved on to other roles.[134]

Recognising the systems-level challenges for cross-sector collaborations

Many layers of "the system" are implicated in the call to expand learning beyond school walls, and this means we need to think about the interfaces between the different worlds of "education" and other sectors—not just at the level of schools and their communities. The E4E Regional Clusters Initiative was designed to make E4E development a shared and networked practice, which can be understood in terms of horizontal and vertical collaboration. The aim was to have a range of groups feed into E4E development at various "horizontal" layers of the education system (illustrated by each row in Table 5 below). The aim was also to have a "vertical" ground-up *and* top-down approach to E4E development, so that the learnings at each layer could inform one another (illustrated by the left column in Table 5 below).

Table 5 **Collaboration enabled by the cluster model**[135]

Layer	***Groups involved (i.e., input for E4E development is sought from …)***
Project level	teachers, students and business/community partners.
School level	a range of teachers representing different learning areas (e.g., art, English, maths, science, business etc.).
Cluster level	a range of schools from across the region.
Regional level	a regional co-ordinator, who works with/is advised by a range of sectors, such as local businesses, school leaders, community associations, local government etc.
National level	a partnership between education and economic development agencies, with input from a range of other sector bodies, such as the Ministries of Youth Development and Economic Development, Enterprise New Zealand Trust, Post Primary Teachers Association.

Another representation of these layers is presented in Figure 5 below to emphasise a relationship between "education sector" on the left-hand side and the "business sector" on the right-hand side. The lines represent how E4E provided a conduit for different sectors (e.g., education and community/business) and various layers (e.g., national level with local level) to come into contact with each other.

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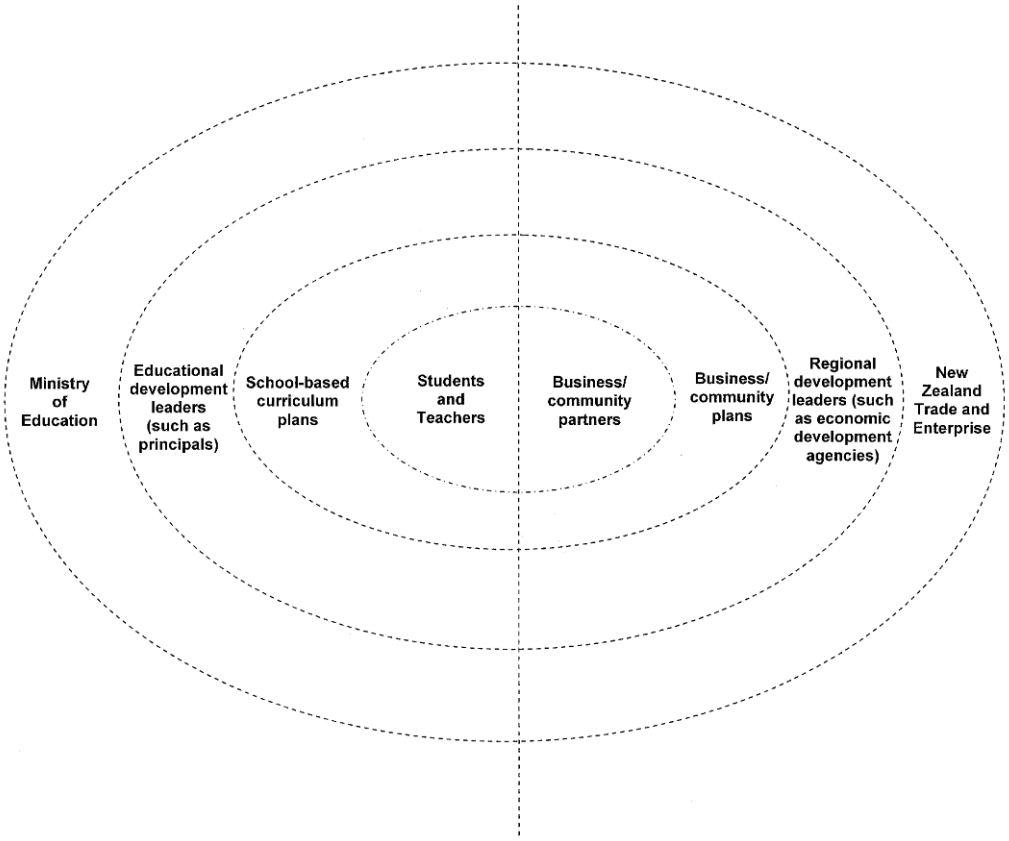
[132] In many cases, the students' E4E work was directed at doing something beneficial for their *school*, or for teachers or learners in their school or in a partner school. For examples of the range of activities carried out as E4E, and their impacts for student learning, see Bolstad et al. (2010, pp. 79–107).

[133] The E4E Regional Clusters Initiative model included a regional E4E co-ordinator in each region, typically associated with the region's economic development agency. Key aspects of the E4E co-ordinators' roles were: to support schools to understand and develop E4E; to support E4E partnerships between schools and their local communities/businesses; and to facilitate enterprising leadership across the region.

[134] Boyd et al. (2005) report similar findings.

[135] This model has parallels with the six strands of an effective Network Learning Community programme described in Jackson and Temperley (2007).

Figure 5 ***Local and national interfaces between education and business sectors in the E4E Regional Clusters Initiative***



The E4E Regional Clusters evaluation identified evidence of philosophical differences between those within the education sector and those outside the education sector. This was sometimes manifested in each sector being perceived as "not really understanding" the realities of the other. For example, from the business and community partner perspective, there was sometimes a view that the current education system does not necessarily "teach the right sorts of things"—that is, that schools do not provide enough of the kinds of learning that employers and the community value.

Likewise, some people in the school sector wanted to emphasise what they saw as the philosophical differences between the goals and realities of education, and the goals and realities of business. For example:

> Business is about making money, education is about life. (Principal, 2007)

> Businesses and business people have an idea of what it takes to become a business person [but they don't] understand the realities of school students. (Principal, 2007)

In addition to these philosophical differences, a range of practical challenges arise out of the very different planning cultures and requirements in each sector. Table 6 provides a simplified summary of some of these differences.

Table 6 **Simplified education and business plans at the interface**

	School-based curriculum plans	***Business plans***
1.	Curriculum plans are subject-based	Business plans are project-based
2.	School planning is assessment-driven	Business planning is market-driven
3.	Education is timetabled	Business time is money

However, beyond their immediate differences, the evaluation showed that it was possible that people from schools, businesses and communities could share similar "big-picture" goals with respect to education. For example, seeing education as an investment in young people as future citizens, workers and members of the community, and/or seeing the point of education as being to develop lifelong learners who will continue to learn and contribute their own energies and efforts in the environments they encounter through the rest of their lives (including workplaces and community settings). These kinds of shared views could provide strong motivation for working through the challenges of cross-sectoral partnership.

Linking learning to "community contexts" is not always authentic/engaging for the learner

It is important to note that "real projects for a real purpose" are not *necessarily* perceived as personally relevant to the learner, if they aren't supported by practices that reflect ideas outlined in the previous sections (such as personalising learning, supporting learners to have more input into shaping their learning etc.). The example in Table 7 below illustrates this point. In this small example, students were engaged in carrying out a project that was of real-world relevance for a community partner, and that provided an authentic opportunity for students to learn and use disciplinary skills and knowledge . Yet for various reasons, the actual work involved in the project was experienced by students as "business as usual", in contrast with another project they had done that *didn't* have a focus on doing something relevant for a real-world purpose. This underscores a point made earlier; it is not enough for the learning to *seem* as though it is relevant, engaging and connected to students' interests. There have to be opportunities and strategies that support *students themselves* to feel engaged with, connected to and invested in the learning work they are doing.

Table 7 **A real-world project is experienced as "business as usual" for students**[136]

A local government body wanted to gather data about cycle transport in the area. A contractor to the council contacted a local secondary school, and the school's education for enterprise (E4E) group decided it would be a good project for a particular top-stream junior maths class. The teacher told the students they would be doing this project, and the students had a certain number of periods to design and carry out a survey within their school to find out about the proportion of students who cycled to school (putting statistical concepts such as sampling and data analysis into practice). The students also came up with several recommendations about ways that cycling to school could be made more attractive to students. Unfortunately, time constraints meant that the students did not have the opportunity to present their results and recommendations to the client (this was later done by their teacher).

A small group of students from the class were interviewed. During the interview, the students contrasted the mathematics/statistics survey project with another learning experience they had been involved with as part of their school's gifted and talented extension programme. In the latter programme, students had spent most of a term working on a project linked to the theme of "time", integrating their science, social studies and English periods:

> [In the gifted and talented programme] we had a week to choose our topic [related to 'time'] and the rest of the term we worked on it [in our small groups]. If we needed a hand [our teachers] would help us, like some of us needed to go on trips outside the school … like if we needed to go down to the mall for a period and interview the public, we could.
>
> The 'time' project we did for the whole term, it was kind of like, you could do what you want, there wasn't a structure … [but] if you don't get it done it's not going to be good on the day, [so you learn to] use your time wisely. Whereas for the maths one it was 'you need to get this done by such and such a time, you need to do this today, this tomorrow, this the next day …'

Although the students saw that the cycling survey was going to be used for a real purpose, because they had not been able to follow up with the client themselves, they were not sure precisely what had happened with their research after they had completed it, nor whether it would lead to a change in the numbers of students cycling to school. Overall, they had preferred the gifted and talented project, because they felt they had more choice, flexibility, motivation and self-direction in their learning—even though these projects had not necessarily involved producing something that was meeting a real need in the real world.

The example above highlights that "real-world" relevance on its own cannot be *assumed* to necessarily create a sense of personal relevance to the learner. However, data collected in the two-year E4E evaluation suggest that most students *did*

[136] See Bolstad et al. (2010).

experience "real project for a real purpose" learning opportunities to be at least as relevant and engaging—if not more so—than their other school learning experiences:[137]

> The stuff we had learnt in class was used in a more practical and real way that required us to learn more and look at things in a more in-depth way. (Year 13 student)[138]
>
> It made me realise about how things work in the real-world. It was good meeting people from our community. (Year 10 student)

This has also been the case in other studies of school curriculum innovations involving students learning through real-world projects within their school, community or in partnership with people from businesses or other organisations.[139]

Summary: What is currently happening vs. what needs to happen

Better community connections are an obvious way for schools to access the resources they need to provide 21st century learning experiences. Stronger engagements between the education sector and other sectors will also be needed if there is to be engagement by the wider community in supporting the kinds of changes and innovations that have been argued for across the future-oriented educational literature. We return to this idea again in Section 10.

However, as outlined above, current work in this area is taking place in pockets or on the fringes of the mainstream. If this work is to be scaled up, it needs more systemic support—in contexts where it is seen as being part of the platform on which a 21st century education system is possible. This support will need to provide opportunities for the partners to work in the spaces between their different areas of expertise, to talk and listen to each other—across professional and/or cultural boundaries.

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[137] In 2008, almost 75% of students surveyed in the evaluation of the E4E Regional Clusters Initiative felt that, compared to their normal classes/teaching, the E4E project/activity had provided a better way to get an understanding of ideas and knowledge related to the subject area(s) involved. Forty-five percent of students wrote a comment to explain their answers. Their rationales ranged from gaining more in-depth understandings of local, national or global issues, to seeing how the subject-related learning (such as in English, science or business) could help them in their future lives and careers.

[138] Both quotes are from Bolstad et al. (2010, p. 101).

[139] See Boyd et al. (2005), Hipkins (2011).

9. The role of new technologies

In many people's minds, new technologies are synonymous with future-oriented education. Rapidly evolving technologies open many exciting opportunities for learning in the 21st century. However, research in schools suggests new technologies only enable transformation when they are supported by ideas and social contexts that enable transformative practice. As the OECD/CERI notes:

> the rapid development and ubiquity of ICT are resetting the boundaries of educational possibilities. Yet, significant investments in digital resources have *not* revolutionised learning environments; to understand how they might requires attention to the nature of learning.[140]

For the most part, educational thinking about ICT has moved on from the idea that simply introducing new ICT tools and infrastructure into schools will trigger beneficial and meaningful educational change.[141] Five years ago, NZCER synthesised findings from a number of studies about ICT in schools to examine what strategies were being used in the drive to turn schools into ICT-rich learning environments.[142] Our analysis suggested that at least four strategies were being used:

- providing enabling tools and infrastructure[143]
- providing inspiring ideas and opportunities to connect ideas[144]
- enhancing capability[145]
- supporting innovation.[146]

Our synthesis suggested that *all four* strategies are needed in order to support meaningful changes in practice (see Figure 6). The double-headed arrows indicate that the important thing is not so much which strategy comes first, but that *all* four strategies are present, and that the right support is available at the right time. Our analysis suggested that the absence of any of these elements could hamper development of ICT-supported "21st century" teaching and learning in different ways (see Table 8 below).

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140 See Dumont et al. (2010).

141 The kind of thinking that underlies this approach—a form of technological determinism—has been strongly criticised. See Brown and Murray (2003), Cuban (2001), Oppenheimer (2003), Robertson (2003), Warshauer (2003).

142 Bolstad and Gilbert (2006).

143 For example, the Laptops for Teachers scheme, rollout of broadband to schools.

144 For example, through conferences such as ULearn, Learning@School and forums such as the digital research learning network and virtual learning network.

145 For example, through the ICTPD clusters.

146 For example, through initiatives such as the digital opportunities (digiops) programme and e-learning teacher fellowships.

Figure 6 ***Linked strategies needed to support educational ICT innovations***

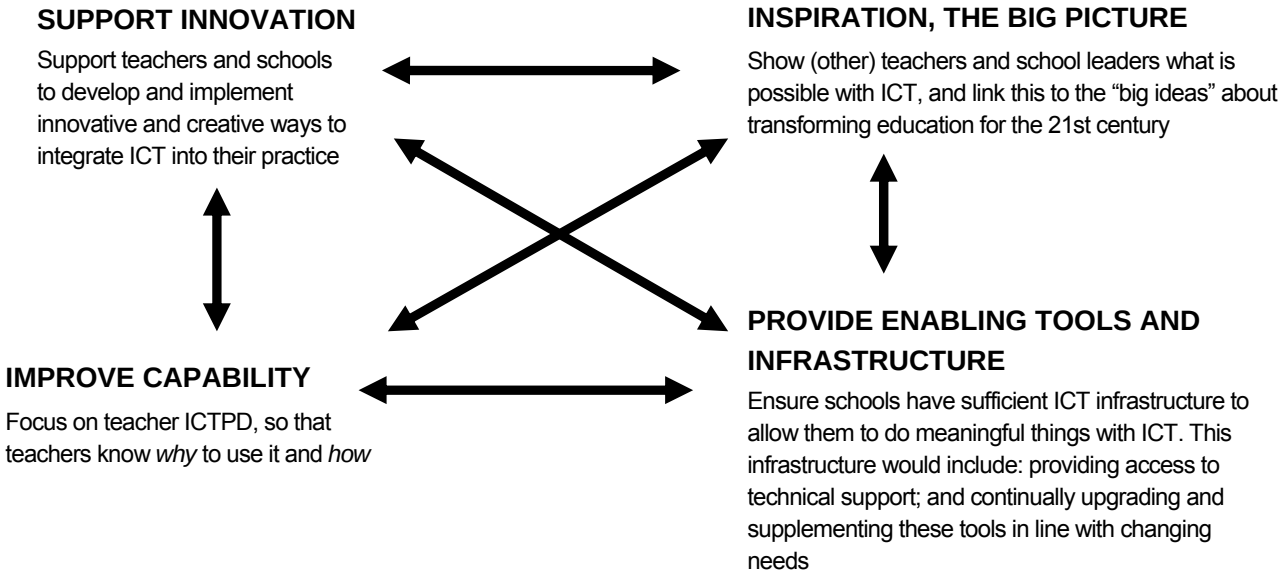

Table 8 **Missing elements, and the results**

Missing element	***Result***
Inspiration/The Big Picture: Teachers and school leaders don't have opportunities to see what is possible with ICT or, if they do, this is not clearly linked to the "big ideas" about transforming education for the 21st century.	Teachers don't see *why or how* ICT can fit into (or change) teaching practice. If ICT is used, it is used mainly by enthusiasts, to do "old" things in "new" ways. Pilot projects might be developed, but don't get taken up in "mainstream" practice. Most practice doesn't change.
Enabling tools: Teachers and students do not have enough access to the types and quality of ICT tools they need to achieve their goals.	Teachers and students cannot actually do what they want to do with ICT, even if they *do* see how ICT can fit into (or change) teaching practice and *want* to work in these ways.
ICT capability: Teachers don't have enough ICTPD, or enough of the right kinds of ICTPD.	Teachers either don't see *how* ICT can fit into (or change) teaching practice, or *why* (or *if*) it should. If they do, they cannot actually do what they want to do (or want their students to do) with ICT.
Support for innovation: Innovators are left to work things out on their own. They may innovate in spite of, not because of, the wider school structures, but this is mostly done in isolation or in their spare time.	Pilot projects might be developed but not get taken up in "mainstream" practice, so that most practice does not change. Innovators are so devoted that they "don't have a life" and eventually suffer burnout.

In the 5 years since this synthesis, some things have changed. Schools now have, on the whole, better infrastructure and access (although many schools still believe they are constrained by these issues). More teachers have taken part in ICT professional development (ICTPD) and gained experience using a variety of technologies in their teaching. Evaluations of the Ministry of Education's ICTPD teacher professional development initiative indicate that for many teachers the programme has stimulated deeper reflective practice about teaching and learning, including better understandings of "student-centred" teaching and learning, increased knowledge of teaching and learning theories, and challenging pedagogical perspectives through sharing and discussion.[147]

[147] Sahin and Ham (2009).

There is a growing community of e-learning experts and enthusiasts who have utilised opportunities to network, connect, collaborate and share their practice with each other through conferences such as ULearn, not to mention online forums and new social media such as blogs and Twitter. The technologies themselves have also changed. Laptops are giving way to smaller mobile Internet-capable devices. Students and teachers are using Web-based tools and applications tools, and these are increasingly accessible through personal mobile devices. Data storage is moving into the "cloud".[148]

However, across these earlier studies and the new data gathered for this research, it is clear that while a range of new (and rapidly evolving) technologies are being used in schools for a range of purposes, and teachers' and students' confidence and capabilities in this area continue to increase, there is still insufficient knowledge about how ICT-related thinking and practice can be more consistently connected with the "big-picture" ideas about future-oriented learning outlined in this synthesis (see Sections 5–8). In the context of this report, it is relevant to ask: What role can or do new technologies play in promoting, enabling and transforming practices linked to the six emerging themes for future-oriented learning outlined in this report? In other words, how are they enabling—or how *could* they enable—educators and learners to experience practices that:

- personalise learning?
- strengthen learning and support greater equity and inclusivity through connections with and responses to diversity and difference?
- develop students' learning capacity through the use, generation and transformation of knowledge?
- enable shifts in learners' and teachers' roles (to support the practices above)?
- support and promote continuous professional learning for educators and educational leaders (to support the practices above)?
- strengthen partnerships and relationships between schools and the community (to support the practices above)?

Some of these ideas are reflected in the snapshots from practice below, in which two teachers reflect on the changes in their practice in relation to digital technologies, each seeing these as part of a wider transformation in thinking and practice.

[148] Wikipedia defines cloud storage as a model of networked online storage where data are stored on virtualised pools of storage that are generally hosted by third parties (see http://en.wikipedia.org/wiki/Cloud_storage, accessed 17 January 2012).

Snapshots from practice

Example 1[149]

> Being an online learner myself has probably been the biggest influence in the way I think about teaching and learning for the 21st century. Knowing that the future is the most 'uncertain' than in any other century and the skill base, knowledge base and Web tools are changing on a daily basis, that it is not what we need to know any more but how to use the information and tools that are available, effectively and efficiently. The Key Competencies are so important to how we teach, and to ensure that we have developed understanding in what we deliver so that students of the future can transfer these skills to whatever context they find themselves in. It is not about the tools that are currently available and how to use them, but what to do with those tools which is so important.

Example 2[150]

> I believe that the role of ICT and digital technologies can play a pivotal role in my '21st century teaching and learning' approaches … Today:
>
> - Students bring me high-quality images or photos they've taken on their smartphones, we bluetooth them onto my laptop and print them out in colour, or they bluetooth them onto their ipads and copy them from there for their artworks. They research artworks and galleries from around the world via Google, they plug their ipods or ipads into the sound jack and play them through the speakers that came with the data projector set up. I find art-related you tube movies for us to watch and learn about what artists are doing around the world now.
> - Students don't have to get out of their seats to communicate with a friend on the other side of the school, or in another city, or country ... I teach students who don't even go to my school via moodle and videoconference.
> - Since I started teaching art history via videoconference and WestNet moodle (via the VLN), a whole new 'world' of professional learning and teaching and learning opportunities has opened up.
> - I know exactly what the political climate and current issues are in art education even though I live in a geographically isolated place you can't even fly or drive out of for amounts of time during winter.
> - I go home to work during the day when I can as I can connect via VPN to school management systems and can receive and send work emails instantaneously so I know when I'm needed.
> - I feel like my laptop is another part of my arm as I feel a bit lost without it. I want a smart phone so I can record learning conversations as they happen and video student critique discussions on the spot, for action research purposes etc. ...
> - Student attendance reports and results are digital and accessible to help any teacher in a school know as much as they can about the learner in front of them ...
> - I can skype an artist to talk to as part of my class learning if I want to ... I can put all my courses online for students and parents to access. Parents can monitor students' attendance period by period ...
>
> All of these changes (and there are plenty more) demonstrate the pivotal role of digital technologies that aren't just changing teaching, but are bringing a whole new learning paradigm and way of existing into being.

Compiling this research synthesis, including analysis the new data from the online submissions and case studies, leads us to conclude that while there is a growing body of research about technology use in schools,[151] and many qualitative examples such as the excerpts above which point towards the use of technologies for transforming learning, it is still difficult to pull together a coherent picture of the actual and potential role of new technologies in relation to the future-oriented ideas outlined in Sections 5–8. As one teacher put it:

> As you would see by now, ICT and digital technologies play a huge part in the way we work with students and fellow colleagues. Without these tools, we would not be able to operate. The challenge however is to identify the 'best practices' in the use of the hardware provided and available to ensure the 'best learning' occurs for our 21st C teaching and learning.[152]

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149 From an online submission by a secondary teacher who teaches in the virtual learning network.

150 From an online submission by a secondary school art teacher.

151 For example, see Bolstad and Gilbert (2006), Bolstad and Lin (2009), Ham (2002), McDowall (2011), Rivers and Rivers (2004), Sahin and Ham (2009).

152 From the teacher quoted in Example 1.

This begs the question of what "best learning" might look like through the lens of a future-oriented learning system. For example, research on secondary students' experiences of learning in virtual classrooms identified students' and teachers' views of virtual classrooms were underpinned by a mixture of assumptions and expectations about teachers' and students' roles, what counts as "learning", what kinds of responsibilities each party ought to take in supporting and managing learning and so on. New Zealand research suggests that new technologies and ICTPD *can* provide support and stimulus for teachers to transform the ways they think about their practice, as in the example below.[153]

Example 3[154]

> I am also involved with facilitating online and face-to-face 'Communities of Practice' [through a virtual learning network], particularly for visual arts and art history at this stage, to create a virtual 'department' for isolated and sole charge teachers from schools [in this region], so that teachers of these subjects can share ideas, resources, professional development and moderation, and to reduce their sense of isolation in their jobs. This is at the beginning stage, though I have secured some funding to get things started. This is a 'blended' approach to professional growth and collegiality between same subject teachers at different schools, using current information technologies to get connected, when face-to-face meetings are difficult due to geographic isolation and having to travel vast distances over challenging or occasionally impassable roads makes staying connected very difficult.

However, we have also identified many examples across prior research and in the new data gathered for this project illustrating the use of new technologies within "old" ways of thinking about learning and teaching. As McDowall[155] identified in a study of teacher e-fellows, the most important factor in enabling teaching and learning shifts were the e-fellows themselves: these were experienced teachers who had been investigating questions about their practice for many years and had developed deep expertise, not only in e-learning, but also in their deep understandings about learning, and about the nature of their discipline. The e-learning fellowship provided teachers with release time from the classroom to be used for activities such as: planning; observing; reflecting; working with small groups of students; reading and researching; conversing with and observing other teachers; developing e-portfolios on their inquiries; and time and space to meet together as a professional learning community. All of these factors enabled e-fellows to explore the affordances of ICTs for doing literacy "differently" and in more future-oriented ways.[156]

Summary: What is currently happening vs. what needs to happen

The key message for this section is that the role of new technologies in transforming teaching and learning for the 21st century is heavily dependent on educators' abilities to see the affordances and capacities of ICT in relation to *all* of the features of 21st century learning outlined in this report. In addition, schools need to have *all four* of the supporting strategies shown in Figure 6 above—that is, infrastructure, inspiration, capability and opportunities for innovation—to achieve these kinds of learning and teaching.

Whether new technologies are being used "transformatively" to support future-oriented learning, or to achieve more traditional learning goals, many teachers and school leaders continue to identify ongoing issues related to the accessibility, availability and reliability of the technologies they believe they and their students need to best support

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153 See also Bolstad and Lin (2009), McDowall (2011), Sahin and Ham (2009).

154 From the same teacher quoted in Example 2.

155 McDowall (2011).

156 Specifically, McDowall (2011) and the e-fellows found that ICTs enabled students greater choice about how to make meaning of and with texts than afforded in a print text environment. It enabled them to work with diverse others by providing access to ideas of people and texts in time and place that would otherwise be unavailable to them. Students could specialise according to individual strengths and interests by providing opportunities to make meaning in modes other than, as well as including, print text. They could share ideas by providing a neutral, communal space for the storage, retrieval, discussion and adaptation of texts held neither by individual students, teachers, parents nor community members, but accessible to all; and they could reflect on, revisit, add to and adapt ideas over time by making it easy to keep a record of every iteration of texts and discussions.

their learning. The question is how to ensure that increased accessibility, availability and reliability of new technologies over time is paralleled by opportunities and supports for teachers and learners to develop future-oriented learning and teaching, capitalising on the affordances of these technologies.

Building on what we have learned from our involvement in this work over many years now, we think that the planned introduction of an ultra-fast broadband network for schools could be an important node around which to refocus thinking in this area. While ultra-fast broadband will obviously allow schools to do more of what is outlined above, and to do it faster and better, it also offers other possibilities—if we want to take them up. If we think of "bandwidth" as referring to a system's capacity to handle a multiplicity of different signals simultaneously, we could develop this as a metaphor for thinking about 21st century education: that is, a "high bandwidth" education system that can not only support, but actively *encourage* the development of a multiplicity of diverse "signals" simultaneously, *not* one designed to produce signals that need to be standardised (or modulated) to fit into a "dial-up" system (20th century assumptions and technologies). As argued in Section 4, just as multiplicity and diversity are essential to the survival of a whole range of natural systems, they (and an infrastructure that can support them) are essential to the redevelopment of our education system for the 21st century.

10. Supporting and sustaining innovation

Charles Leadbeater[157] argues that there is a need "for a wave of more systematic and radical innovation in education and learning". Such innovation, he argues, "should take place simultaneously, at different levels and in different settings, from the daily practice of teachers and learners, through organisations, systems and platforms, to the social movements and ideologies that inspire them". He further suggests that a key task for an *educational innovation strategy* is "to create the demand for innovation and the conditions in which it can thrive".

Part of creating the demand for innovation, in Leadbeater's view, is to draw public attention to the growing gap between the kind of education systems we *have*, the kind of learning we *need* and the technology available to enable new ways to learning and how it is used, such that the public begin to demand and support educational innovation to build new practices within the "space of what is possible". He suggests that:

> this means developing, communicating, sharing and spreading ideas in down to earth language and with concrete examples that can command a much wider assent and following.[158]

This is challenging given the inherent complexity of identifying present-day examples of what future-oriented learning could look like. However, evidence from many of the studies synthesised in this report show that substantial innovation capacity exists in the New Zealand education sector,[159] and under the right conditions this can help to generate new examples of future-oriented thinking and practice.

Below, we summarise what the research synthesised in this report tells us about the challenges for supporting and sustaining innovation in the New Zealand school sector.

Substantial innovation capacity exists in the New Zealand education sector, but not all of it is leading towards future-oriented teaching and learning

Across many studies we have found examples of innovators in school settings whose thinking and practices align with some of the features of future-oriented learning described in this synthesis. However, we were not able to find examples of educators or schools with all of these features, in a developed form. Some new schools (e.g., Albany Senior High School, Stonefields School) come closer, but even these schools are continuing to reflect on their experiences, refine their ideas and approaches and remain open to the question of "where to next".

Amongst innovative schools, teachers and educational leaders there are varying degrees of understanding and engagement with the theoretical/philosophical roots of the ideas underpinning the six themes identified in this report, and little engagement with the extent to which these ideas conflict with the theoretical/philosophical roots of much current practice. Across the studies we looked at there was evidence of practices that were seen as innovative by the educators involved, but which, on closer inspection, had not dislodged "old" ideas, practices, systems, structures and routines.

The New Zealand Curriculum has assisted in catalysing change for some schools, teachers and school leaders

The two CIES studies and other research on innovative schools since the mid-2000s indicate that *NZC* is a key policy lever for catalysing changes in practice. This was particularly the case for schools that were already on change journeys,

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157 Leadbeater (2011, p.4)

158 Leadbeater (2011, p.8)

159 In particular, see Bolstad et al. (2010), Boyd et al. (2005), Boyd and Watson (2006), Hipkins et al. (2011).

built on foundations of professional development/professional learning over several years. The way *NZC* was co-constructed acted to support, as well as tap into, this localised capacity for innovation.[160]

These studies suggest that working with innovators, rather than giving top-down policy directives, enables knowledge to be built at all levels of the system. However, this does not address the central challenge: that this knowledge development is slow and uneven, and, in most cases, it is not taking account of the future-focused themes described in this synthesis.

Vision, leadership and opportunities to access support for "next steps" thinking are needed

Key school leaders can set in place a strong "21st century learning" vision at individual schools, but for this vision to produce substantial and sustainable changes in practice, schools need certain conditions in place (e.g., skilled leaders who are willing to unbundle school practices, expert teachers with support from their team, a strong learning community focus between teachers, a focus on effective pedagogy etc.). This raises an important policy: How can new leaders be nurtured with the skill sets now necessary in this environment (e.g., culturally competent, systems-thinkers, co-constructors, able to cultivate distributed leadership etc.)? Are succession plans in place?

To continue to build innovation, schools at some point need to look beyond their internal resources to access external resources (including facilitation, professional learning and new ideas). Collaborations between schools, or between school leaders, can be a support for innovation, when they provide the conditions to share and collaboratively interrogate current practices in relation to future-focused educational ideas. CIES and other studies of school innovation suggest schools often reach points at which the "next step" is not immediately apparent.[161] This is likely to be a frequent occurrence in an innovative system. If people are genuinely engaged in unpacking and questioning current practice, they are likely to recognise that there is a need to do things differently. The challenge is that there are no ready-made examples or models that exist to show exactly what that "different" should look like. Schools can look to other innovative schools, educationalists and thought leaders for intellectual input that may help them through these gaps, but ultimately it needs to be recognised that no-one holds all the answers. "Next steps" thinking requires people to be comfortable with the idea of a learning system built around a culture of continuous learning and innovation (see Section 7). It requires all levels of the system to be learning and deliberately adopting knowledge-building strategies, whether at the level of individual schools, clusters or the wider system.

Time is needed for recursive elaboration

It is difficult to make substantive changes in schooling over a short time frame. Initiatives designed to foster educational innovations in New Zealand frequently suffer from short time frames and consequently tend to follow the same pattern of a burst of activity (related to extra funding or accountability deadlines) then a fizzling out or change in focus. There is a need to keep a focus on supporting innovation over the longer term.

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[160] This "co-construction" was multilayered, including:

- the sectors' engagement during the drafting phase of NZC, which led many educators and school leaders to begin exploring and unpacking some of the emerging ideas around (for example) key competencies, and the proposed vision, values and principles in their schools several years prior to the release of the new curriculum document
- the opportunity to have input into and provide feedback on the draft document, which also helped to ensure that the intentions of the finalised NZC were largely supported and endorsed by the sector
- the implementation of NZC in schools, which provided further opportunities for leaders, teachers and (to varying extents) students to collaboratively co-construct meanings and practices and to engage in learning conversations based on the various ideas contained within NZC.

[161] See Hipkins et al. (2011, pp. 83–89).

Coherent and enabling support and/or direction is needed from the wider system

For schools to continue on a journey towards reshaping teaching and learning for the 21st century, their work needs to align with educational policy directions, be supported by suitable resources and system-wide consideration of ways to address barriers to change. The studies we have synthesised show that sometimes policy directions align with the direction of innovations. For example, *NZC* aligned well with the directions in which many schools were already heading. However, at other times, policy directions can slow the progress of innovation by shifting priorities or resources in different directions. To enable innovation to thrive, coherence is needed across different aspects of system-level support, including areas such as:

- system-wide professional learning
- curriculum and assessment approaches and resources
- creative building policies
- ICT approaches/resources/PD.

A system-wide plan linking each of these areas together could help to show how these areas can work together to create a coherent, connected vision for 21st century learning in New Zealand.

11. Future vision: What could it look like?

Doing the work described in this report—synthesising the findings of existing work on future-oriented learning, drawing out the six key themes used to organise the work and investigating the extent to which these six themes are influencing practice in New Zealand schools—has suggested three big ideas. We conclude this report by putting forward these key ideas as a way to structure the thinking that will be needed to develop a policy/system response to the question of how we can rebuild New Zealand's education system for the 21st century.

These three ideas are "diversity", "connectedness" and "coherence".

Idea 1: Diversity

This idea encapsulates the current focus on developing strategies to ensure learners from all backgrounds can achieve success in ways that both have meaning for them (e.g., *as* Māori), and allow them to be active participants in 21st century society. However, it also extends it to signal the emphasis on education *for* diversity (of people/groups and ideas/knowledge) that is a necessary feature of 21st century education. It also helps us think differently about personalising learning—to be a useful 21st century learning strategy this must involve a commitment to something more than the individualised, modularised or online learning packages of existing knowledge that are currently on offer. To be transformative, personalising learning has to involve learners and teachers working together to co-construct "bespoke" curricula that are specifically designed to meet the identified learning needs of individual students.[162] The learner's capacity to produce themselves is developed via (i) the co-producing relationship they have with their teacher/mentor, and (ii) the connections their teacher/mentor helps them to make with whatever they need to do this (e.g., other people, places, resources or online learning sites). Thus, schooling that takes account of diversity and that educates *for* diversity must have high levels of connectivity/connectedness.

Idea 2: Connectedness

This idea puts together (i) the "connectivity" that has become possible via the technical developments of the digital age with (ii) the 21st century's emphasis on "third spaces"—working *across* and *between* current categories (people, groups, ideas, knowledge systems and so on), rather than focusing on the categories as "things in themselves". The point of this connectedness is not to "get"—and assimilate—what the other (person/group/set of ideas) has to offer, but to work *with* them (in the third space) to together co-produce something new. Thus, connectedness is linked with education for diversity—working productively and happily with "diverse" others requires competence in working in "third spaces".

If, as argued in Section 9, we see "bandwidth" as allowing greater diversity as well as faster connectivity, then the development of the ultra-fast broadband network in schools will allow us to further combine diversity and connectedness.

Idea 3: Coherence

Many of the ideas discussed in this synthesis are "out there"—albeit in various stages of development. What is needed is, not more effort focused on the *parts* of this system (as we have seen in the past with the fostering of, for example, personalising learning, ICTPD or community engagement), but strategies designed to *put these ideas together*: we need a way forward that goes beyond "ticking the boxes", even in relation to the six emerging themes for future-oriented learning outlined in this report. Rather than asking *are* schools personalising learning; *are* they educating *for* diversity (as well as working to achieve success for all learners); *are* they building learning capacity; *are* they reconceptualising

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[162] The learner as "prosumer" model advocated by Leadbeater—see Bolstad and Gilbert (2008, p. 121).

the roles and responsibilities of teachers and students; *are* they engaged in continuous professional learning; and *are* they developing a range of new "real" partnerships with their communities, we need to join all this up in a way that is driven by a coherent set of shared ideas about the future of schooling and its purpose and role in building New Zealand's future.

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Appendix 1: Previous NZCER research projects synthesised to identify emerging themes for future-oriented learning and teaching

Project title	Personalising learning	Changing roles and relationships (e.g., teachers and learners)	School–community–business connections and partnerships	Competencies for 21st century teachers	Sustaining change/ Scaling up innovation	New technologies/ICT/ e-learning	Methodology(ies)	References
Evaluation of the Curriculum Innovation Projects	X	X	X	X	X	X	Case studies	Boyd et al. (2005)
21st Century Schools	X	X			X		Case studies	Hipkins (2011), Hipkins et al. (2008)
Evaluation of the Education for Enterprise (E4E) Regional Clusters Initiative		X	X		X		Mixed methods (surveys, interviews, case studies)	Bolstad et al. (2010)
Curriculum Implementation Exploratory Studies	X	X	X	X	X	X	Case studies and teacher/school leader "reflective workshops"	Hipkins et al. (2011)
Students' experiences of learning in virtual classrooms						X	Mixed methods (online survey, videoconference focus groups)	Bolstad and Lin (2009)
Research on the Tech Angels initiative at Wellington Girls' College		X				X	Interviews (students, teachers, principal)	Bolstad and Gilbert (2008)
Successful Home–School Partnerships			X				Case studies	Bull, Brooking and Campbell
Family and Community Engagement in Education (FACE)			X				Mixed methodologies	Bull (2011)
Teachers' work				X			Teacher interviews	Bull (2009)
Leading learning				X			Case studies	In progress
Literacy learning in e-learning contexts		X			X	X	Case studies	McDowall (2011)
Background to the Key Competencies					X		Case studies	Hipkins et al. (2007)
Key Competencies in Normal Schools	X	X	X	X	X		Mixed method case studies and reflective workshops	Boyd and Watson (2006)
NZCER National Survey		X		X			National surveys	Hipkins (2010a, 2010b)