EXPLORING NEW METRICS FOR EDUCATION 3.0

OPPORTUNITIES AND CHALLENGES FOR SHIFTING ASSESSMENT PRACTICE AT TE KURA

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Te Kura
Te Aho o Te Kura Pounamu
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Foreword

Te Kura wishes to ensure that all its learners are equipped with the knowledge, skills and competencies of the New Zealand Curriculum, growing their dispositions to contribute as good citizens in this rapidly changing and complex world. This requires building learning for each learner in an approach that draws from Big Picture authentic learning philosophies and focuses on modern technologies available to "increase learner's motivation engagement and achievement, fostering innovative ways of working collaboratively"[1]. Te Kura calls this approach Education 3.0.

This publication builds on the 2012 NZCER publication commissioned by the MoE *Supporting future-oriented learning and teaching – a New Zealand perspective* which was used as a catalyst for thinking at the Global Education Leaders Programme (GELP) in 2012. It builds on more recent GELP work, particularly focused on the proposition that a "future oriented learning system requires that all those involved in education are involved in continuous learning". The question then was "How should learning be measured?" which GELP has grappled with through the notion of "new metrics".

Te Kura has worked with its teachers and learners and with the assistance of NZCER has drawn on recent approaches to the purposes of assessment, to identify promising new strategies for assessing dispositions for learning, assisted by visualisation tools and learning analytics afforded through modern technologies.

I hope you will be as excited as we are at some of the research and thinking brought together in this publication.

We offer this publication as a means of furthering the discussion and the required actions to build new metrics and enact future focused learning.

Karen Sewell
Chairperson
Board of Trustees

Mike Hollings
Chief Executive

[1] 2012 Supporting future-oriented learning and teaching – a New Zealand perspective, report to MoE by NZCER

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Responding to the Education 3.0 agenda

The phrase ‘Education 3.0’ is used to signal a complex and still-evolving paradigm shift from the traditional schooling models of the 19th and 20th centuries (Education 1.0), via an intensified focus on teachers’ and school leaders’ accountabilities in relation to students’ learning (Education 2.0), towards a more holistic model of education that is appropriate to the 21st century. This report scopes possible Education 3.0 metrics that Te Aho o Te Kura Pounamu—The Correspondence School of New Zealand—might consider using to document the learning of students, and associated practices used by teachers to support that learning.

Rapid changes in the world outside education, particularly but not only in information and communication technology (ICT), are driving the Education 3.0 agenda. Assessment practice in schools now needs to transform rapidly, but how best to do so is not straightforward. Continuing with relatively traditional learning programmes, albeit with adjustments to how learning is assessed, will not adequately address the *New Zealand Curriculum* (*NZC*) vision for a 21st century curriculum.

Sociocultural theories of learning have gained increasing prominence in an ICT-enabled world. Consequently, new types of assessment tools for gathering Education 3.0 metrics are underpinned by sociocultural ideas. A key difference between sociocultural learning theories and cognitive learning theories is that the latter focus mainly on the individual students and do not take account of the ways in which contexts affect students’ opportunities to learn, which is what sociocultural theories do. What teachers do to support students makes a critical contribution to their learning success.

Assessment for learning is a key feature of 21st century frameworks, but it is not straightforward to put into practice. Teachers need access to assessment resources developed with an explicit focus on how to use the data generated to effectively support students’ next learning steps, and to involve students in the assessment decision making. Other assessment challenges include: providing opportunities for metacognition, managing evidence derived in group contexts, and aggregating multiple instances of competency demonstrations across learning contexts and over time.

The key competencies in *NZC* are one response to the challenges broadly sketched here. However, their uptake has been slow because they are multi-faceted and it takes considerable time to develop a deep understanding of their intended role. They are more appropriately seen as *changing* the curriculum rather than *adding* to it. Outcomes for learning need to be re-imagined at the complex intersection of competencies and traditional content prior to determining any assessment approaches. Nationally and internationally this re-imagining has proven to be demanding, and teachers are likely to need professional support to deepen their own understanding of key competencies.

Twenty-first-century approaches also place increased emphasis on the quality of intellectual activity, and on being able to use new learning in authentic demonstrations of capability (i.e. real tasks where students choose and justify the best course of action, actively employing their new knowledge and skills). Learning is seen to include important dispositional components that are not easy to assess. However, there are strong synergies between the idea of key competencies and the *NZC* principle of *learning to learn.* Assessing dispositions related to learning to learn has promising potential. Learning-to-learn initiatives also potentially open up important opportunities for families, whānau, iwi and hāpu groups to engage in dialogue about the learning they value for their young people.

OTLE provides an opportunity for ongoing change

Building and deploying the Online Teaching and Learning Environment (OTLE) repository of new curriculum resources provides a timely opportunity for Te Aho o Te Kura Pounamu (Te Kura) to build on and extend current efforts to design a school curriculum that is responsive to *NZC*'s 21st century signals. Annotated e-portfolios provide a practical way to address the assessment challenges outlined above, but their effective use relies on developing rich tasks that allow students to demonstrate their growing competency levels. Innovative curriculum thinking needs to inform the development of these rich tasks.

Learning outcomes that meet the Education 3.0 agenda require teachers to purposefully orchestrate and support specific types of opportunities to learn. There is considerable consensus about the design principles that should guide the design and delivery of appropriate and effective learning opportunities. One implication is that new resources for OTLE will need to be designed in ways that allow students to take up and develop the intended Education 3.0 outcomes. However, design on its own will not be sufficient: how teachers interact with students and respond to their learning will be critical to opening up opportunities for students to stretch their growing capabilities.

The curriculum leaders at Te Kura are already aware of the potential for key competencies to transform the focus of both curriculum and assessment. They are already asking critical questions about what is assessed and why. Although some of their questions are unresolved as yet, their curriculum thinking is a promising work in progress. The curriculum leaders are also aware of the need to work strategically to integrate assessment opportunities across the curriculum, and they are interested in the potential to use e-portfolios. They see integrated assessment as especially challenging in the senior secondary school in the context of the National Certificate of Educational Achievement (NCEA).

The team leaders at Te Kura already place a strong emphasis on pastoral care and on getting to know students as individuals in the context of their families, whānau and communities. They are aware of the importance of learning dispositions and would like to see data gathered to acknowledge positive instances of learner engagement and growth. They seem ideally placed to lead learning-to-learn initiatives at Te Kura. However, it will be important to establish processes for connecting their work to that of the curriculum leaders. Currently they appear to have quite different curriculum imperatives.

There is an immediate need to consider how to effectively integrate curriculum and team leaders' knowledge to support a deep synthesis of the enacted curriculum across the whole teaching staff.

It is not clear to us how many other Te Kura teachers are open to and taking part in cutting-edge curriculum thinking and/or strongly engaged student support practices. This challenge will need to be addressed if OTLE resources are to be used as intended.

The importance of making strategic change decisions

Given the somewhat overwhelming nature of the changes as a whole, strategic decision making is needed to determine where to begin and what new assessment tools to adopt. It will be critical to determine which types of change to prioritise. Deep curriculum change will prompt a need for assessment change, but we do not recommend using assessment change to drive curriculum change.

As part of the strategic design it will be important to select tools that complement rather than duplicate data-gathering opportunities. As a first step towards selection it is important to be clear about what assessment information will be used for, and why. The report introduces four broad purposes for assessment and compares their high-level features (assessment for accountability or systems-level learning; summative assessment for reporting and credentialing; assessment for learning; and assessment to foster lifelong learning). Data from standardised assessment are typically aggregated for accountability purposes. Data gathered to inform ongoing learning could also be aggregated, but this is not usually done. Te Kura could address this challenge in the overall design of their Education 3.0 metrics by selecting 'smart' assessment tools[2] with the potential to work synergistically across these four purposes.

Why rich professional learning will be the key to success

No change will be effective unless it is accompanied by ongoing opportunities for rich teacher professional learning across the whole Te Kura staff collective. The teachers will need opportunities to explore different types of learning outcomes and the associated implications for the ways in which they interact with students and their families. This will help to ensure that new assessment tools make more sense to all the teachers, and will be used in the spirit intended.

It is likely that teachers will need opportunities to discuss and debate their working theories about the nature of learning, and to explore key insights from sociocultural learning theory. Doing so will support them to make best use of new assessment tools that embed sociocultural assumptions. For example, assessment to support students to become ongoing successful learners is difficult to do well because

[2] In this context, smart tools are thinking and learning tools that support the transfer of knowledge. Smart tools generate feedback that allows their users to: inquire into their own and others' practice; lead change; analyse and respond to data sets; think smarter, and therefore act more effectively; and evaluate, monitor and assess.

centrally involving students in making assessment decisions has never been part of traditional assessment practice. Teachers need opportunities to reflect on why this is now seen as desirable and when it is appropriate to do (and when not), and to work through any reservations they might have.

Next steps

Creating a coherent assessment plan is an important next step so that the impetus for change is maintained but is not overwhelming. This plan should make clear connections between any assessment tools selected so that intentional coherence in the system is evident to all users of these tools (teachers, students, parents/whānau).

As a next step we recommend Te Kura convene a workshop, attended by key staff, to discuss key messages from this report and prioritise various options for action.

1. Introduction

Key points

Rapid changes in the world outside education, particularly in ICT, are driving the Education 3.0 agenda. Assessment practice in schools now needs to transform rapidly, but how best to do so is not straightforward.

Strategic decision making is needed to determine where to begin and what new assessment tools to adopt. The following sections outline specific challenges that will need to be taken into account, and provide some research-informed recommendations to support that decision making.

This report scopes possible Education 3.0 metrics that Te Aho o Te Kura Pounamu—The Correspondence School of New Zealand—might consider using to document the learning of students and associated practices used by teachers to support that learning.

Sweeping changes collectively known as 21st century phenomena have mostly originated and evolved outside the education sector.[3] But given their profound implications for how individuals, communities and nations live, work, interact and care for each other, and for the planet, it is important that education systems—and schools within them—respond and transform rapidly. Helping them to do so is the Education 3.0 agenda and the main focus of the Global Education Leaders' Partnership (GELP).[4]

Education 3.0 debates highlight new types of outcomes needed to thrive in today's world. These outcomes include a range of things that have not been measured in traditional assessments of students' learning. They demand a rethinking of purposes for education, and different sorts of metrics to document how well those purposes have been met.

Making more effective use of ICT, both for learning and for assessment, is central to the GELP agenda. Indeed, it is central to most frameworks of outcomes or competencies that claim a 21st century framing, because ICT-driven changes are an integral part of the social changes to which education systems must respond (Dede, 2009). One systematic analysis of a range of 21st century frameworks recently noted that

> The development of ICT is not only regarded as an argument for the need for new competences by all frameworks, but it is also associated with a whole new set of

[3] For an extended discussion in the New Zealand education context, see Bolstad & Gilbert, 2008; Gilbert, 2005.

[4] For background information, see http://gelponline.org/

> competences about how to effectively use, manage, evaluate and produce information across different types of media. (Voogt & Pareja Roblin, 2012, p. 308)

As New Zealand's largest virtual learning organisation, Te Kura is uniquely placed to take the lead in trialling approaches that document Education 3.0 outcomes using digitally based tools and approaches. Te Kura's current migration to a new online portal for supporting students' learning is opening up opportunities to test potential approaches, and to engage in rich professional learning conversations about what kinds of outcomes matter and why.

The logic of the GELP agenda is comparatively straightforward to outline in principle. However, deciding exactly where to invest in new approaches, and why, is not at all straightforward. There are many more potential candidates for attention than could ever be manageably assessed. New types of outcomes are not always clearly conceptualised, and the nature of developmental progress towards what might be considered mature outcomes is still relatively unknown. Tools of varying sophistication and in varying stages of research-informed development exist, both nationally and internationally.

The challenge for Te Kura is to make wise and practical decisions as it works towards building an Education 3.0 assessment plan for the school. Ideally, an overall plan would have parts that ultimately work together and enhance each other, with the aspiration that the whole become more than the sum of the parts.

This report has been developed to support strategic decision making by the Te Kura leaders and board of trustees. As well as keeping the future-focused and theoretical challenges in mind, we have kept in mind the practical characteristics of Te Kura, outlined in their request for proposal (RFP). These stipulations include that any tools and approaches suggested be:

- methodologically valid
- able to provide consistent information over time
- seen primarily as formative
- take into account the benefits and costs (practicalities) of implementation.

Although this work is essentially forging new ground in the New Zealand context, there is useful prior work that can inform the approach Te Kura decides to adopt. This report distils key messages from existing research of relevance to the identification and selection of areas on which to focus and to the metrics that could be used. These insights are brought together with key findings from workshops with two groups of Te Kura teachers to scope challenges and key areas for decision making.

2. Being clear about assessment purposes

Key points

It is important to be clear about what assessment information will be used for, and why. This section introduces and compares four broad purposes for assessment: systems accountability and reporting, certification and selection, improving teaching and learning, and supporting lifelong learning.

Assessment to support students to become ongoing successful learners is the most expansive of these four purposes but is difficult to do well, in part because involving students in making assessment decisions has never been part of traditional assessment practice.

Data from standardised assessment are typically aggregated for accountability purposes. Data gathered to inform ongoing learning could also be aggregated, but this is usually not done. Te Kura could address this challenge in the overall design of its Education 3.0 metrics.

Rationale for this section

> It is possible that a focus on 'metrics' jumps too quickly over the concepts and debates currently occurring in the field about reforming the design and purposes of assessment in education systems. (Breakspear, 2013)

In his recent briefing paper to the metrics sub-group of GELP, Simon Breakspear warned that it is important to frame the debate within wider research and policy discussions that call for a *re-imagining* of the purposes for learning and assessment. In other words, there is a prior debate to be had about the learning that most matters, and about the purposes that assessment should serve. This section provides a high-level scoping of these twin challenges to act as a broad framework for the following sections.

What types of outcomes are in scope?

Four key areas where performance information needs to be systemically gathered were identified in a presentation to the 2013 GELP meeting:[5]

[5] http://gelponline.org/sites/default/files/resource-files/new_metrics_slides.pdf

1. **the state of the system**, and particularly its potential to deliver 21st century learning outcomes

2. the extent to which **learning processes** are exhibiting the characteristics expected to support successful 21st century learning

3. the extent to which 21st century **learning outcomes** are being achieved

4. the **life outcomes** achieved by 21st century learners.

Te Kura is interested in all these areas, with a specific focus on learning outcomes with a 21st century orientation. They asked that explicit attention be paid to the potential for the key competencies included in *The New Zealand Curriculum* (*NZC*) to transform traditional outcomes. We respond to this request in section 4, where we confront the beguiling question of whether the key competencies should be assessed, and if not how the effectiveness of their presence in the school curriculum—as indicated by the learning outcomes students achieve—might best be evaluated.

We also address possible metrics for the GELP framework domains of 'learning process' and 'life outcomes' (i.e. bullet points 2 and 4 above). There is potential for these to be co-developed alongside the key competencies highlighted in Te Kura's request.

Learning processes are important because *what teachers do to support students* is as important as what students themselves bring to their learning. Over a number of research projects we have found that opportunities to foster students' key competency development are closely linked to teachers' use of effective pedagogy.[6] We address the challenge of evaluating and documenting pedagogies for learning (or 'opportunities to learn') in section 7.

Learning processes also draw attention to learning to learn, and the importance of a deep intellectual engagement with learning. The latter has recently been highlighted by the GELP engagement group as critical for thriving in the 21st century.[7] Again, there are strong potential synergies between learning to learn and the *NZC* key competencies (Hipkins, 2015b). These *dispositional* aspects of competencies are discussed in section 8.

Life outcomes are important for signposting what *students might be and become* as teachers and others help them to strive towards their goals. In several recent projects we have found that teachers who successfully support students to develop aspects of the key competencies have a dual focus on short-term (traditional academic) goals and on longer-term goals for students in their futures (Hipkins & McDowall, 2013). This observation applies to 'academic' achievement as well as other types of learning goals. During academic learning the dual focus on both current and future outcomes is likely to impart a sense of relevance, and makes deep intellectual engagement with learning more likely.

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[6] See for example http://nzcurriculum.tki.org.nz/Key-competencies/Key-competencies-and-effective-pedagogy

[7] http://gelponline.org/sites/default/files/members-documents/gelp_sf_learner_engagement_pre-reading.pdf

The focus on life outcomes, however, gains a certain poignancy—and urgency—when we consider students whose learning goals might lie outside the traditional academic spectrum. These can include students with special learning needs, and those who have been let down by their prior learning experiences, for whom Te Kura often offers an alternative pathway to try and get back on a learning trajectory. It is clear from our conversations with some of Te Kura's learning advisers during this project that many such students undertake part or all of their education through Te Kura's programmes. We think the question of documenting progress towards meeting life outcomes is critically important, but this need not be done at the expense of achieving academic outcomes. Rather, rich tasks could well allow gains to be made in the achievement of both academic and life outcomes.

What purposes are envisaged for the metrics used?

Since any metrics that Te Kura chooses to adopt must be 'fit for purpose', it is important to scope potential purposes for assessment, and, if possible, anticipate where tensions between them might lie. A report written during the early development of *NZC* explored the question of whether and how key competencies might be assessed (Hipkins, Boyd, & Joyce, 2005) and identified three purposes to which assessment might be put. A similar range of purposes was identifed in a recent GELP briefing (Breakspear, 2013).

Purpose 1: Systems accountability and reporting

This is arguably the most familiar purpose to which assessment metrics might be applied. There are well-established precedents for using large-scale assessments to report on students' learning progress, but also to gauge schools' success in helping students meet the intended outcomes of their learning and to monitor the success of government policies. There are high stakes attached to accountability, and this can lead to 'gaming' of assessments by students, teachers and even policy makers (Breakspear, 2013).

Standardised summative forms of assessment are typically used to collect data for accountability purposes. Assessment issues tend to be technical in nature, and validity is defined by technical, rational, psychometric principles. These kinds of assessment programmes have historically relied on pen-and-paper tests, but over time new forms of assessment tasks are being devised; for example, to try to gather evidence in the context of authentic tasks. Digital assessment design is advancing rapidly, driven in part by programmes such as PISA, which are looking to introduce more authentic assessment activities into large-scale international assessment frameworks (Dede, 2009).

Purpose 2: Certification and selection

Breakspear lists this as a separate category, whereas it was subsumed under the accountability purpose by Hipkins et al. (2005). Like *systems* accountability, assessment for certification and selection is a high-stakes activity, in this case particularly for individual students. Breakspear points out that this is why certification activities and metrics attract substantial attention from parents and the media, with a high political risk attached to making changes to the standardised summative forms of assessment employed. An implication is that in any move to Education 3.0 metrics, careful attention will need to be paid to NCEA and the National Standards for literacy and numeracy in the primary sector—both for the opportunities and for the challenges that standards-based assessment might provide. Again, we do not see a focus on core traditional academic outcomes as being an either/or choice with 21st century outcomes. The challenge is to devise ways to address both types of outcome via rich learning and assessment tasks.

Purpose 3: Improving teaching and learning

In this case the main purpose of the assessment is formative: to provide feedback to the learner. This has been a focus for research on teaching and learning for several decades. The argument for its importance is expanded and refocused in the 21st century literature, where it has become a central concern for groups working to produce competency-based frameworks. This is because new types of outcomes must be both experienced and discussed if learners are to come to understand their central importance to overall learning progress (Voogt & Pareja Roblin, 2012).

Hipkins et al. (2005) note that formative assessment of competencies needs to take place in authentic contexts, sometimes provided by the teacher, at other times selected by the learner. Typically the final judgement about the quality of the learning is made by somebody else, such as a teacher or parent, although the learner should be involved in discussions about their learning and what they are trying to achieve. Indicators such as exemplars may give guidance (to learners or teachers, or both) on what to look for.

Purpose 4: Supporting lifelong learning

Hipkins et al., but not Breakspear, identify assessment to empower students as lifelong learners as another purpose for assessment. The *NZC* vision statement aspires to have all New Zealand young people become "confident, connected, actively involved lifelong learners" (Ministry of Education, 2007, p. 8). We think it is important to pay explicit attention to these highest-level ongoing capabilities rather than assume they will follow if traditional curriculum learning is successful (see the next two sections).

Supporting lifelong learning requires *students* to take an active part in collecting evidence and in the judgement of their own performance. Indeed, the assessment itself may become an important part of learning in 21st century contexts (Voogt & Pareja Roblin, 2012). This intention was

captured in the policy report *Directions for Assessment in New Zealand* (the so-called DANZ report) via use of the phrase "assessment capability" (Absolum, Flockton, Hattie, Hipkins, & Reid, 2009). Building students' assessment capability is central to learning to learn but is not yet commonly practised in New Zealand classrooms (Hipkins, 2015b).

Situating learners centrally in the process of both learning and assessment can be very empowering for them. Their viewpoint is included, and they share the interpretation of the assessment information with the teacher. This could involve students selecting the evidence that demonstrates the competencies they can exhibit within the learning context. While this might take place within the classroom, it could also be within contexts outside of formal learning situations. There is usually some sort of validation of students' own judgements, and these sorts of assessments can be used for summative purposes (to demonstrate a competency for employers, for example), but assessment can also be used formatively to identify areas for future learning.

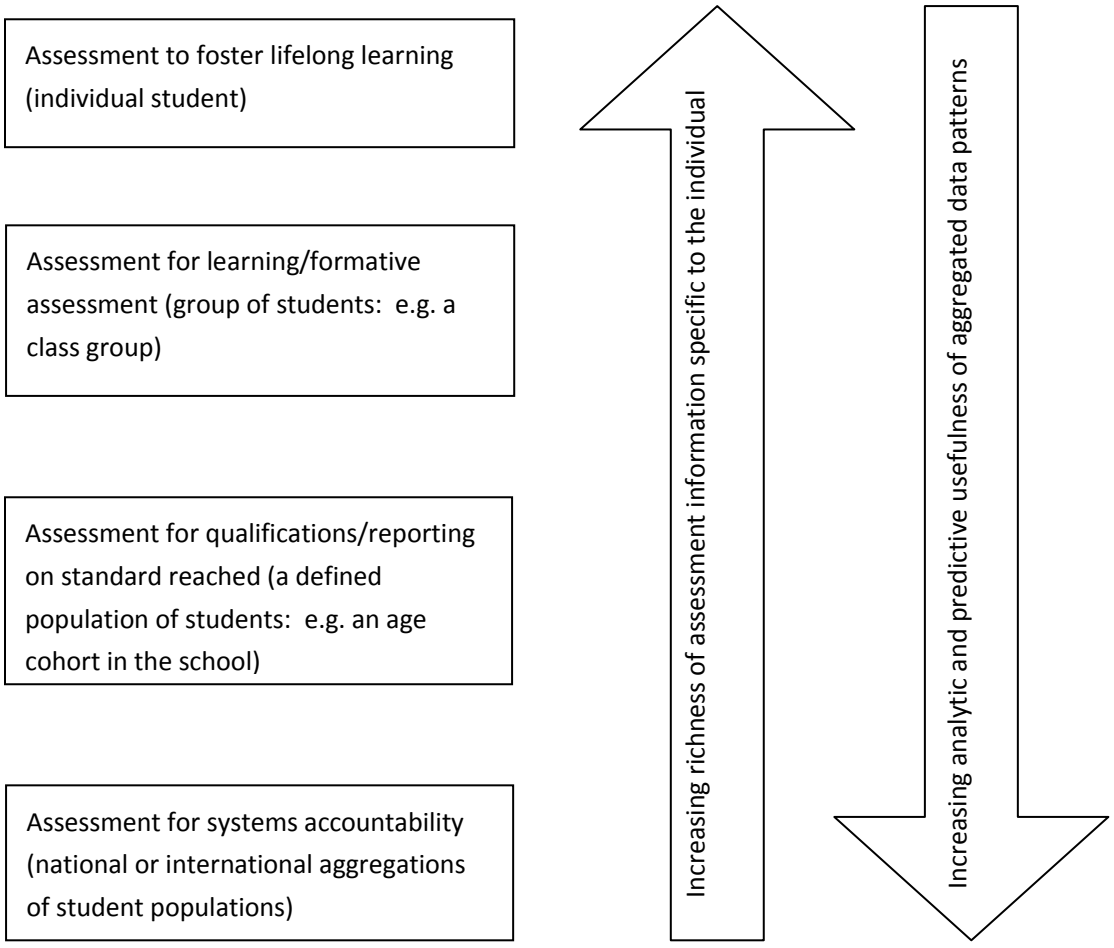
Commentary

The relationships between different purposes for learning are summarised in Figure 1 (below). Breakspear notes a lack of interaction (via feedback loops) between assessment for learning (which is typically located at the classroom or individual level) and assessment for accountability. He describes this as a "fundamental error" in the design of assessment systems. It will be even more challenging to build robust feedback loops with data aggregated for accountability purposes from richly contextualised but individually specific data gathered by students—and in some cases their whānau or wider community—for the purpose of fostering lifelong learning.

The Te Kura leadership now have the opportunity to create an overall assessment design that seeks to build feedback loops between the data gathered for these different purposes. Doing so should be central to decision making as the plan for introducing Education 3.0 metrics is devised and enacted. How well this can be done will depend on the choices of assessment tools made for each type of purpose.

We can see potential synergies between the imperative to link different assessment purposes and the way in which Te Kura teachers already work with students. Participants in the workshops we held with Te Kura curriculum and team leaders were excited by the possibilities they could see for placing students at the centre of learning, but also expressed frustration that outcomes related to doing so are not yet assessed (see sections 6 and 9). There are some big challenges to be addressed if the building of students' assessment capability is to become a key teaching and learning goal.

Figure 1 **Relationships between purposes for assessment**



3. Sociocultural learning theory and 21st century contexts

Key points

Sociocultural theories of learning have gained increasing prominence in an ICT-enabled world. Consequently, new types of assessment tools for gathering Education 3.0 metrics are underpinned by sociocultural ideas.

A key difference between sociocultural learning theories and cognitive learning theories is that the latter focus mainly on the individual students and do not take account of the ways in which contexts affect students' opportunities to learn.

Teachers who have a sound grasp of the key tenets of sociocultural learning theory, and the implications of this theoretical framing of teaching and learning challenges, will be in a strong position to maximise the use of new tools and the metrics they gather. There are implications for teachers' professional learning.

Rationale for this section

Just as it is important to be clear about purposes for assessment, it is also important to be aware of the ways in which *learning* is framed by different assessment tools. This framing will determine the types of assessment questions asked and the sorts of answers sought as Te Kura works toward devising a plan for, and then implementing, Education 3.0 metrics. There is a risk of missing important insights if we take for granted that it is obvious what 'learning' is.

Supporting teachers to expose and explore their tacit working theories has been identified as an important component of effective professional learning (Timperley et al., 2007). Many 21st century ideas about assessment make better sense from the perspective of a sociocultural framing of learning, which implies that this is an area that could be fruitful to explore. New assessment practices and tools might be more readily adopted when the majority of teachers share a commitment to sociocultural ideas.

A focus on sociocultural theories of learning

Brain-based (rational) thinking is the 'cognitive' activity that most of us have in mind when we think about learning. Evidence of successful learning is sought by assessing cognitive gains in important basic skills (e.g. literacy or numeracy) or expansions of content knowledge. Ideally these basic cognitive gains will be accompanied by evidence of deeper understanding—the higher-order cognitive activities, which are displayed as critical and creative thinking, the ability to apply knowledge to new contexts, and so on. Long-established assessment traditions support this approach by providing familiar ways to gather data that are demonstrably valid and reliable within this specific framing of learning. This framing of learning is fine as far as it goes (and we address it in the next section), but it is not sufficient for addressing 21st century learning challenges.

Cognitive theories of learning do not take into account the idea that learning can be *distributed* across people, place and things. This idea is central to sociocultural learning theories and also to debates about the competencies needed for living in the 21st century. One prominent researcher of ICT in educational contexts has recently noted that

> … much of what distinguishes 21st century skills from 20th century competencies is that a person and a tool, application, medium, or environment work in concert to accomplish an objective unobtainable otherwise (e.g. remote collaboration via groupware among a problem finding team scattered across the globe). However ICT are not mere mechanisms for attaining desired behaviour; through distributed cognition, the understandings they enable are intrinsic to fluent performance (e.g. a group co-constructing a sophisticated conceptual framework using the representation tools available in a wiki). (Dede, 2009, p. 9)

Two researchers with expertise in the teaching and learning of computer programming have recently created a synthesis of the key ideas that underpin the various families of sociocultural learning theories, of which there are several (Tenenberg & Knobelsdorf, 2014). Tenenberg and Knobelsdorf identify four key principles that underpin sociocultural learning theories, all of which have implications for assessment decision making.

1. **Cultural tools mediate learning activity**: physical tools, digital tools, languages, symbols systems, etc. can enable or constrain learning in specific ways. Ways of using these tools become internalised as we learn and then act to mediate what we can do next. One specific assessment challenge here is that our tool use is always *contextualised*. Assessment of traditional capabilities tended to assume a generic type of competence, but this is now seen as problematic. Like so many of the challenges already outlined in this section, digital tools have created new types of contextual challenges. As one example, Dede (2009) notes that we now need to develop the ability to rapidly filter huge amounts of incoming data (e.g. when we perform an Internet search) so that we can "separate signal from noise" (p. 2). Doing this involves a "suite of 21st century skills" (p. 2), and these are always contextual by their very nature.

2. **Cognition involves looping between brain, body and world**: the *externalisation* of thought happens in many familiar contexts (e.g. when we draw what we think, or create models to test ideas). As outlined in the quote above, it is also a key feature of digital collaboration and co-learning in the 21st century, where, again, it is always contextual (Dede, 2009).

   Embodied thinking is another important idea here. An example might be how our hands 'remember' manual skills once we have acquired them, bearing in mind that such skills cannot be acquired simply by *thinking about* what they might entail. One specific assessment challenge implied by the idea of embodied learning is that cognitive gains *per se* are not *adequate* evidence of learning (Hipkins, 2015a).

3. **Cognition is distributed across people and tools**: the idea of distributed cognition has already been described by Dede in the quote above. It is alluded to in the *NZC* description of the key competencies and again has important assessment implications. How to assess group learning and performance is one obvious example.

4. **Learning happens when participation in ongoing cultural practices transforms what both learners and others can do:** a key idea here is that participation causes practices to evolve. The way tools can be used keeps changing, practice becomes more complex, and the entry point for new learners keeps shifting accordingly. Assessment needs to identify dynamic moving targets in these conditions. Recent commentary about effective professional learning also highlights complex dynamic change as a challenge faced by *teachers* when they are learning to transform their practice (Yorks & Nicolaides, 2013).

   Another key idea is that people can typically do more than they can say—tacit knowledge plays an important part in practice, especially as expertise builds. This idea raises assessment challenges when juxtaposed with the idea that metacognition is a key aspect of assessment, which fosters lifelong learning. (Metacognition is also central to building key competencies, as discussed in section 5.) The key assessment question here is how to effectively bring these hidden dimensions of learning and knowledge into view so that they are more explicit for both learners and teachers.

Commentary

The ideas outlined in this section give an indication of how shifting the frame of reference for the nature of learning also shifts the types of assessment questions that might be posed and addressed. The complexity and unfamiliarity of the issues raised could easily seem overwhelming, but these are the areas that hold the greatest potential for genuinely innovative assessment development.

Picking several carefully targeted entry points for changing assessment will provide a strategic way to manage this challenge. However, there are also implications for the ongoing professional learning of the teachers at Te Kura, who should not be expected to implement a new assessment programme without having the opportunity to discuss and explore their own tacit thinking about

the nature of learning. Any new professional learning will ideally include opportunities to explore new ideas in the context of different disciplines and/or for the kinds of learners with whom teachers already work.

4. Weaving assessment for learning into the fabric of the curriculum

Key points

Assessment for learning is a key feature of 21st century frameworks, but it is not straightforward to put into practice.

Teachers need access to assessment resources developed with an explicit focus on how to use the data generated to effectively support students' next learning steps.

Rationale for this section

Formative assessment has been identified as a key feature of 21st century frameworks (Voogt & Pareja Roblin, 2012). If students are going to become lifelong learners, they will need to develop the skills and knowledge to become discerning assessors of their own learning progress.

Te Kura leaders are already aware that a shift to making greater formative use of assessment data will be an important and timely part of the Education 3.0 mix. The shift to the Online Teaching and Learning Environment (OTLE) platform potentially opens up new ways of involving students in such assessment. However, care needs to be taken to choose assessment tools with the potential to provide worthwhile and valued feedback (i.e. feedback that can effectively inform the next learning steps). This section discusses the characteristics of suitable tools and revisits the challenge of building feedback loops between assessment purposes (section 2).

Why assessment for learning is professionally challenging

Sometimes the terms 'formative assessment' and 'assessment for learning' are used interchangeably. However, assessment for learning has evolved as the more expansive concept of the two. Formative assessment signals that the predominant purpose should be to inform the *teacher's* decisions. What the teacher and/or learner do with the information gained from the assessment task is the critical feature that makes this task "informative of learning" (Newton, 2007). Assessment for learning adds the idea that *students* should be actively involved in making decisions about their learning progress and needs (Dixon & Hawe, in press). Using the term

'assessment for learning' also avoids the potential for some teachers to see formative assessment as practising for summative assessments.

For *informed* student involvement, this feedback information should give the students a clear indication of what quality work looks like and show a variety of ways that good work might be achieved. In this type of assessment there is less emphasis on one 'right' way (Sadler, 2009). Annotated examples, rubrics and criteria (ideally co-constructed with students) are examples of support that can help students to analyse their work.

In principle, assessment for learning can be applied to any existing curriculum programme and resources. One important proviso is that assessment tasks are designed to be richly informative, with the teacher having a clear idea of the type of evidence they want to gather, the feedback they want to give, and how the student might get involved in the assessment decision making. In practice, enacting effective assessment for learning has proven to be easier said than done. Designing suitable tasks is difficult. Also, though teachers can often recognise where students need help, they may not know what to do next to provide effective and timely learning support. This has been called the Achilles heel of assessment for learning.

The assessment resources we outline next proactively address the challenge of informing the next learning steps on the basis of assessment results. This means that, when used appropriately, they have the strong potential to provide professional support to enhance teachers' knowledge and practices when enacting assessment for learning.

The Assessment Resource Banks (ARBs)

The Assessment Resource Banks (ARBs) are Ministry-funded collections of resources with a strong formative rationale.[8] They are specifically designed for use in the New Zealand context and are based in the English, mathematics and science learning areas of *NZC*. ARBs are smart tools. They provide a robust platform for scaffolding next steps in both student learning and teaching practice. ARB resources were initially developed for comparatively traditional 'pencil and paper' use by groups of students in a class. Moving the resource banks to an interactive online environment has recently provided the opportunity to rethink their customised use by individuals or groups of students.

Rather than giving a picture of overall achievement, each ARB resource focuses on a particular aspect of learning that a teacher or students may want to explore more deeply. Each task is designed to provide insights into the strategies, understanding and knowledge that students bring to it as they demonstrate what they can achieve.

While many other tools provide technical support for teachers to make judgements about student work and achievement, a focus for the ARB resources has been to actively work towards

[8] http://arb.nzcer.org.nz/

knowledge building of both teachers and students. Every assessment item developed for the ARBs in recent years has been akin to a small research project that compares the response indicated by the curriculum to the types of responses made by students, and suggests possible steps to take to close the gap between the two. Teacher notes provide information to help the teacher support the students to use each task in this way.

The recent move to create digital assessment items that provide real-time interactive feedback has brought to light new and demanding task design challenges (Joyce & Fisher, 2014). Tick-box right/wrong answers are the easiest type of interactive feedback to provide, but questions that elicit these simple responses cannot adequately address complex capabilities such as those now signalled as important by *NZC* (see the next section). Some of the new ARB resources respond to this challenge by deploying strategies that directly draw students into the assessment decision making:

> Support is given for looking at the strategies and thinking that the student is using. Interactions between teachers and students, or students and students, are encouraged as students explain their answers. (Joyce & Fisher, 2014, p. 52)

Leveraging the formative potential in standardised test tools

As Figure 1 shows, a limitation of rich tasks designed for assessment for learning purposes is that they are used as one-off assessment events. Student responses are meaningful in relation to the specifics of the context for the assessment and the insights engendered about their thinking while completing the task. While not impossible, it would be a very big task to meaningfully aggregate data across these separate tasks, and doing so would remove a great deal of the responsiveness that is built into their use.

It is possible to generate formative insights from standardised tests, but only if their reporting processes have been developed with this type of feedback in mind. Both types of widely used standardised tests (NZCER's Progressive Achievement tests, the Ministry of Education's asTTle tools) have inbuilt reporting features that were designed to enable formative use of individual, class and school-wide results.

Commentary

The ARB collection of research-informed assessment resources provides one critical tool that Te Kura could use to inform and shift pedagogy through teacher−student and student−student enquiry. One major advantage is that an online platform has already been built to house the new ARB resources that provide instant formative feedback to students while also providing feedback to the teacher. One limitation is that these resources do not cover the whole curriculum and have not been developed for the senior secondary school. ARB resources are free to schools, so Te

Kura can access them at any time. However, building a robust interface between these assessment tasks and the OTLE environment is possible and would provide a very powerful customised assessment resource for Te Kura.

If ARBs and a standardised test were to be used in combination, it could be possible to design an overall assessment strategy that bridges the gap in the feedback loop shown in Figure 1. Doing so would help address the critical gap that Breakspear highlighted in the GELP programme (see section 2). Because data from both sets of tools would ideally be aggregated on the same assessment platform, it would be possible to design data inquiries to look for patterns across responses in both types of tool. Any such inquiries would be most effective if they were designed as explicit explorations of critical *curriculum* questions. One example might be an exploration of relationships between basic literacy skills (assessed by a standardised test) and the ability to draw meaning from rich visual texts (assessed via a suitable ARB item). Questions of this type would obviously need to be prioritised, and doing this would require rich curriculum conversations between and within the various teaching teams at Te Kura. The demanding nature of these curriculum conversations is addressed in the next section of the report.

5. Can (should) key competencies be assessed?

Key points

Key competencies are more appropriately seen as *changing* the curriculum rather than *adding* to it. Many teachers will need opportunities to re-imagine outcomes for learning before they develop assessment approaches that include key competencies in the mix. Nationally and internationally this re-imagining has proven to be demanding, and teachers are likely to need professional support to deepen their own understanding of key competencies.

Twenty-first century approaches place increased emphasis on the quality of intellectual activity, and on being able to use new learning in authentic demonstrations of capability (i.e. real tasks where students choose and justify the best course of action, actively employing their new knowledge and skills).

Assessment challenges include: providing opportunities for metacognition (students demonstrate their awareness of competencies in use); managing evidence derived in group contexts (learning is distributed); and aggregating multiple instances of competency demonstrations (opportunities vary, and different aspects of each key competency are called into play in different contexts).

Annotated e-portfolios provide a practical way to address all these challenges, but their effective use relies on developing rich tasks that allow students to demonstrate their growing competency levels.

Rationale for this section

Can key competencies be assessed, and if so, how? This has been a vexed question since the inception of *NZC*, and it is one that Te Kura has requested we address.

The advice that NZCER has provided to the Ministry of Education on this question, broadly paraphrased, is that there is an important prior question that needs to be answered about the curriculum 'work' that key competencies are expected to do. NZCER's research programme, conducted for almost a decade now, indicates that key competencies are more appropriately seen as *changing* the curriculum rather than *adding* to it. Only after the nature of the intended outcomes has been clarified can discussion begin about assessment that is fit for purpose. This

section explains this argument and provides three broad principles for the design of assessment of learning that includes a key competency dimension.

Key competencies as agents of curriculum change

To understand the argument just made, it is necessary to critically consider the primary purposes that learning should serve. In the 20th century curriculum, the acquisition of knowledge and skills was largely taken as a given for assessment programmes and practices. However, as section 2 has already indicated, rapid social changes such as globalisation and the rapid escalation in the use and sophistication of digital technologies have greatly expanded the range of types of outcomes learners need to achieve to be active participants in 21st century life.

The analysis of 21st century competency-based frameworks undertaken by Voogt and Pareja Roblin (2012, p. 309) identified four sets of outcomes mentioned in all the 21st century frameworks they found:

- collaboration
- communication
- ICT literacy
- social and/or cultural skills, and citizenship.

Most frameworks also mentioned:

- creativity
- critical thinking
- problem solving
- the development of quality products/productivity.

There are clear synergies with the *NZC* key competencies in these lists. The problem is that they do not indicate *how* these types of outcomes connect with the knowledge and skills of the traditional curriculum. They might still be most readily understood as *adding* to the curriculum—something to be assessed on top of (or instead of) traditional content. This conclusion is what has led many schools to develop oversimplified generic rubrics for assessing key competencies. We do not see this as either appropriate or fair (Hipkins, 2009). In any case, such oversimplification misses the real 21st century potential in the very idea of key competencies.

NZC's 'two halves' structure is not helpful for clearly illuminating the curriculum work the key competencies could do. Nor does it help that messages about this curriculum work are only hinted at in excerpts, such as this:

> People use these competencies to live, learn, work, and contribute as active members of their communities. More complex than skills, the [key] competencies draw also on knowledge, attitudes and values in ways that lead to action. They are not separate or

> stand-alone. They are *key to learning in every learning area*. (*NZC*, p.12, emphasis added)

The phrase in italics suggests that the key competencies should be woven into the learning areas. But how this should happen, and for what purpose(s), is up to individual schools and teachers to resolve.

NZCER recently developed a suite of Ministry of Education-commissioned "engaging examples of practice" that illustrate ways to integrate key competencies into subject learning.[9] Leading teachers were our inquiry partners in this applied research. All the examples the teachers helped us to shape demonstrate strong learning benefits when reciprocal relationships between the key competencies and more traditional subject area learning are strategically leveraged. Importantly, it became apparent that all these teachers were thinking about two 'layers' of outcomes for the learning they orchestrated: they had immediate goals (typically specific knowledge and skills), but they also had in mind longer-term goals—things they hoped students would become or be able to do in their futures (Hipkins & McDowall, 2013). The *pedagogy* they employed was critical to how they opened up opportunities for students to become more competent in the ways they had in mind.

This work suggests that outcomes for learning need to be re-imagined at the complex intersection between competencies and traditional content, *prior to* determining any assessment approaches. To illustrate the potential in doing this type of 'next' curriculum thinking, we now pause briefly to unpack the idea of digital literacy as a complex set of capabilities.

Digital literacy as an example of a complex suite of capabilities

Dede (2009) discusses the meaning and scope of digital literacy at some length. He outlines several frameworks, one of which integrates the idea of digital literacy with 'new literacies' implicated in meaning making with digital technologies (Jenkins, 2006, cited in Dede, 2009). Jenkins identified 11 dimensions of digital literacies, listed below:

- play—the capacity to experiment with one's surroundings as a form of problem solving
- performance—the ability to adopt alternative identities for the purpose of improvisation and discovery
- simulation—the ability to interpret and construct dynamic models of real-world processes
- appropriation—the ability to sample and remix media content
- multitasking—the ability to scan one's environment and shift focus, as needed, to salient details
- distributed cognition—the ability to interact meaningfully with tools that expand mental capacities
- collective intelligence—the ability to pool knowledge and compare notes with others towards a common goal

[9] http://keycompetencies.tki.org.nz/Key-competencies-and-effective-pedagogy

- judgement—the ability to evaluate the reliability and credibility of different information sources
- transmedia navigation—the ability to follow the flow of stories and information across multiple modalities
- networking—the ability to search for, synthesise and disseminate information
- negotiation—the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

Again, synergies with the *NZC* key competencies can be identified, although these are less self-evident than in the higher-level lists given above.

Dede notes that this framework is interesting for the way it emphasises the *intellectual activity* that is being performed when a person is working effectively with sophisticated ICT tools (p. 10). Any traditional curriculum learning area could provide opportunities to do these sorts of things—if the task allows and the teacher values the learning journey as well as the end-point of deepening knowledge and skills. These are examples of longer-term outcomes teachers might seek to build across multiple learning experiences. In the short term, they also stand in for more familiar academic learning.

Are we all on the same page?

One challenge in seeing the key competencies as a means of changing the traditional subject-oriented curriculum is that expansive and complex ideas such as competency or capability act as what complexity theorists call "nodal points" (Mannion, Biesta, Priestley, & Ross, 2011). Nodal points bring together a range of ideas to try and fix a particular meaning that can be widely agreed on and used to catalyse educational actions. Mannion et al. use the vivid metaphor of an 'airport' for ideas. People can arrive at nodal points from many different starting points (e.g. values, beliefs, experiences, tacit theories of learning) and depart from them to many different destinations (e.g. valued outcomes of learning, the type of evidence that suggests these outcomes have been achieved).

Nodal points are increasingly a feature of 21st century educational policy and curriculum discourses as policy makers seek support for complex changes. Indeed, the key competencies were a well-received feature of *NZC* when it was first released, perhaps in part because people understood them at different levels but they had an intuitive appeal for everyone (Cowie, Hipkins, Keown, & Boyd, 2011; Sinnema, 2011). As time has gone on it has become increasingly clear that there are layers and layers of complexity beneath the surface simplicity and familiarity of the five named areas of competency. Only when (if) teachers and school leaders have continued to actively explore *NZC*, and in particular the role the key competencies play within the overall *NZC* structure, have these deeper layers come into view (Hipkins & Boyd, 2011).

This, then, is the paradox of ideas that act as nodal points: they are malleable and unstable precisely *because* people can bring a range of opinions and perspectives to them. On the one

hand, this is a good thing, because it offers people the opportunity to interpret things in a way that fits their context—in school contexts teachers can get on with their work and be seen to be 'implementing' the curriculum. On the other hand, it is likely that the way in which students' capabilities might be developed *in practice* may be contested.

The clear implication here is that debate and clarification are needed to ensure that people (school leaders, teachers, parents/whānau and students) have a similar scope in mind when they talk about the nature of the key competencies themselves and the curriculum work they are expected to do. Only then will it become possible to shape appropriate assessment questions.

How can complex competencies be assessed?

International literature and almost 10 years of research on the implementation of and approaches to measuring the key competencies in *NZC* indicate that there is no overall best way to measure competencies, but that there are different ways that are best for measuring specific expressions of competencies in specific contexts. There are three general principles that are worth considering here.

Assess competency *in action*

An early paper on the assessment question recommended that the learning to be assessed might be envisaged and treated as a "complex performance" (Hipkins et al., 2005). An immediate implication is that the assessment task will require students to demonstrate their learning by *doing something non-trivial*. The 'performance' in question will require learners to bring a complex mix of knowledge and skills to bear, in a meaningful context, to complete a task that is sufficiently challenging to engage them, yet not so hard that they cannot show what they know and can do.

This principle accords with the argument above that 21st century outcomes emerge during reciprocal interaction between the intended traditional learning (content, skills) and the aspects of competency being used and further developed. A performance of learning brings together the content, the context and the targeted competency or competencies.[10] All will be needed when there is a rich task to undertake, with just the right amount of challenge for the learner. Note that all the key competencies will be woven into a coherent whole in any one task. It follows that whichever of the competencies is least developed will likely limit what students are able to do.

By their very nature, rich tasks will often cross curriculum boundaries. Arguably this presents a greater challenge to designing learning experiences and assessments at the secondary level than in the primary sector. However, the modular nature of NCEA can allow for the design of integrated rich tasks, so this might best be seen as a structural and curriculum challenge.

[10] Actually, all the key competencies are always in play, but one is likely to be foregrounded for pedagogical purposes.

Another challenge is that some aspects of competency are best enabled and demonstrated in group settings. Collaboration is an obvious example. Traditional assessment judges the performance of an individual, regardless of how well the context enables or constrains that performance (e.g. in this case, how well group dynamics allow collaboration to actually be demonstrated). The underlying tension here is between a cognitive view of learning (i.e. happening primarily in individual brains) and a sociocultural view of learning as situated and distributed (see section 2).

Yet another challenge is that collaboration in 21st century contexts is often virtual rather than face to face. This brings its own complex capability demands, as Dede outlines here:

> In the legacy curriculum, little time is spent on building capabilities in group interpretation, negotiation of shared meaning, and co-construction of problem resolutions. The communication skills stressed are those of simple presentation, rather than the capacity to engage in richly structured interactions that articulate perspectives unfamiliar to the audience. Face-to-face communication is seen as the 'gold standard', so students develop few capabilities in mediated dialogue and in shared design within a common virtual workspace. (Dede, 2009, p. 3)

Given that much of Te Kura students' communication with their tutor (and perhaps with other students) is conducted virtually, there could be opportunities here for designing learning and assessment tasks that require the sort of rich collaboration outlined by Dede. Te Kura cannot unilaterally solve the challenges for assessment in the context of NCEA, but that need not constrain the exploration of useful assessment approaches for other assessment purposes.

Collate evidence from multiple sources

Performances can be variable, for a range of reasons. More than one source of evidence is needed, to deal with issues of validity and reliability. Note that dimensions of the chosen context for a performance will have a different effect on different students' abilities to demonstrate their competencies: students' backgrounds and prior learning experiences can help them see the action possibilities in a task, or not. Thus it will be important to take identity, language and culture into account, both when designing assessments and when interpreting their results.

Possible approaches include the development of annotated portfolios of evidence, or learning logs. Alternatively, the assessor's observation of an authentic performance could be combined with a degree of self- and peer assessment. Note that all these approaches include an element of learner input so that assessment decisions can include consideration of what they were trying to achieve in the performance being judged. Involving them in actually making the judgement is another step again and constitutes the third principle (see below).

A challenge that traditional schools face is that opportunities to demonstrate competency will often be available in settings beyond the school. How to gather, moderate and add that evidence is a challenge that most schools have yet to address. Te Kura has a unique opportunity here because the learning of students already takes place in a wide range of settings and often extends into

students' own communities. This means that it should be easier—at least in principle—to become *aware of opportunities* for individual students to demonstrate learning in their own community settings. However, there remains the challenge of how to be systematic about gathering and recording evidence, and moderating judgements made by others (see below).

One measure of more expansive and stronger competency is whether what the student knows and can do can be adapted and transferred from simpler to more demanding contexts. Again, this underscores the importance of devising a systematic way to record learning achievements from multiple sources, including different contexts, and to keep this record keeping over time.

Involve students in assessment decision making

All of the key findings of NZCER's key competencies research programme support the idea that assessment approaches should engage and involve students in gathering and reflecting on the evidence of their learning and growth. Section 4 also highlighted such involvement as a crucial feature of assessment for learning.

The key competencies research highlights the role that self-awareness and deliberate, strategic use of one's current capabilities play in further developing capability levels. Also, key competencies include motivational dimensions and values that are private to the individual and should not be inferred from observation alone (Deakin Crick, 2008). We return to this set of challenges in the next section.

If rubrics are used, students should be involved in conversations about their meaning and take an active part in the judgement being made. Ideally, they would also be involved in constructing the rubrics in the first place. However, many questions still surround the nature of progression in competency development, so careful attention would need to be paid to any assumptions about the nature of progress being captured in the rubrics.

Commentary

Experience in other New Zealand schools suggests that it will be very demanding to design effective new curriculum and assessment tasks that encapsulate the principles outlined above. This will need to happen right across the curriculum and at all levels of schooling. The teachers at Te Kura will need opportunities to take part in rich professional learning that unsettles tacit assumptions about purposes for learning and revisits the key competencies in a more expansive framing than most schools managed when *NZC* was first introduced.

Some of the ARB resources introduced in the previous section were developed with this challenge in mind. So was the nationally standardised tool Science: Thinking with Evidence.[11] The

[11] http://www.nzcer.org.nz/tests/science-thinking-evidence

Ministry of Education-funded Science Capabilities resource[12] also exemplifies the shift that needs to happen in teacher thinking. However, early indications are that teachers need a lot of support to use any of these resources well. If this does not happen, there will be tendency for some teachers to over-assimilate the ideas and say, 'We already do that' (Hipkins, 2012). Professional learning would ideally combine an exploration of new assessment resources with deeper thinking about key competencies *per se*.

For resource developers this professional learning would be most effective if combined with the actual development of new OTLE resources. However, it will be important that those teachers who are not involved in the actual development of assessment resources also have a chance to develop a deep understanding of their design intent and the specific ways in which it is anticipated they will allow for demonstrations of specific aspects of competency.

Having the curriculum leaders and resource developers work together in assessment design workshops would enable strategic thinking about what to prioritise and why. The complexity of the key competencies and the curriculum transformations they might enable can seem overwhelming and could easily lead to over-assessment unless there is clear thinking about what sorts of demonstrations of competency matter most.

Working together at the design stage will also allow Te Kura to build an overall assessment plan for different groups of students, ensuring that any evidence that individual students accumulate in their e-portfolios will complement and expand their existing demonstrations of competency.

Because teacher insights about the key competencies also continue to expand and deepen over time (Hipkins & Boyd, 2011), it will be important to revisit strategic assessment planning at least annually, and probably more often at first.

[12] http://scienceonline.tki.org.nz/Science-Capabilities-for-citizenship

6. Leading curriculum thinking at Te Kura

Key points

The curriculum leaders at Te Kura are aware of the potential for key competencies to transform the focus of both curriculum and assessment. They are already asking critical questions about what is assessed and why. Many of their questions are still unresolved as yet. Their curriculum thinking is a promising work in progress.

The curriculum leaders are also aware of the need to work strategically to integrate assessment opportunities across the curriculum, and they are interested in the potential to use e-portfolios. They see integrated assessment as especially challenging in the senior secondary school in the context of NCEA.

It is not clear how many other Te Kura teachers are ready and able to take part in transformative curriculum thinking. This challenge will need to be addressed if OTLE resources are to be used as intended.

Rationale for this section

In December 2014 we convened a half-day workshop with Te Kura's curriculum leaders. Six of these curriculum leaders volunteered to prepare a brief presentation, drawing on stories and examples/artefacts from practice in their learning areas to provide insights into how teaching and learning are planned for and carried out, and how student learning is understood and assessed in their learning areas. After each presentation, the whole group discussed what had been presented. Some of the key themes that emerged, and their implications for Te Kura's assessment planning, are outlined in this section.

Leading thinking about key competencies

It was clear that these curriculum leaders value the key competencies and have been thinking carefully about how to build them into curriculum resources being prepared for OTLE. They are also asking critical questions about what exactly they could or should measure and record, and whether and how they might use rubrics to constructively involve students in formative assessment, and in self-assessment. Some curriculum leaders are already doing some experimenting in this area.

One rich thread of the conversation focused on skills and competencies that are "not necessarily taught". One presenter displayed a list of attributes for "designerly ways of knowing and doing" that could potentially be a focus for assessment. This list included:

- **dispositional attributes**: tolerance of uncertainty, optimism and perseverance, taking opportunities, being flexible
- **ways of thinking**: being imaginative, visual thinking, solution-focused fore-thinking, using intuition, divergent or 'off-tangent' thinking, being reflective
- **ways of working:** iterative cycles of exploration and investigation, following non-linear trajectories, and building rich associations
- **ways of communicating**: non-verbal as well as verbal.

There are obvious synergies between this list and the discussion about the nature of key competencies in the previous section. Indeed, participants noted the fit between this list and key messages in the front half of *NZC*.

There was discussion about the iterative processes involved in a student achieving the final product of their work. The question was raised about whether assessment should focus on the final completed product or the process used to achieve it. For example, a student could be exhibiting many important competencies/skills in how they approach their work (e.g. persistence, optimism) yet the final product doesn't quite work out, for whatever reason. Other stories showed how students built iteratively on a piece of work, or a personal passion or interest, and how the Te Kura teacher had supported the student to tailor the learning opportunities that were available. These examples suggested ways in which Te Kura students were demonstrating their agency as active participants in shaping the focus and direction of their learning, and how they were supported and enabled by their teachers to do this.

Several of the presentations touched on questions about the nature of different disciplines and whether and how students experience the authenticity of learning in those disciplines—and whether teaching and curriculum are designed for this. These questions point to the types of changes that key competencies could, and should, make to the way the curriculum content is taught and learned. However, these are new and unfamiliar conversations for most teachers, and we had the sense that this learning journey is just beginning for many teachers at Te Kura, as indeed is the case across schools more generally.

Leading thinking about assessment innovation and challenges

Many of the stories shared by curriculum leaders showed a lot more going on in the students' learning than is currently captured in assessments. For example, participants noted that students were working with knowledge from areas other than the one that was being assessed (e.g. science

in a piece of work assessed for English or technology), but they weren't necessarily being credited for that learning because it was not the focus of the assessment.

Currently, teachers make the judgements about learning. How might learning be captured as a 'natural action', with the learner actively participating in recording and valuing their learning and keeping evidence of it? There was some discussion about the potential for fostering peer assessment conversations about learning via online posts. Other students (and teachers) could comment on the students' work, giving feedback to which the student could then respond.

One presentation showed students working on a collaborative music composition. The curriculum leader talked about some of the most valuable learning and growth for the students in this project, including the sense of trust to be part of a whole, and respect for others—and for the intellectual property of others: "it's very deep stuff in terms of Education 3.0". There is a standard for collaborative composition in music, but "the standard doesn't measure any of the things that went into making it. Nothing gets captured about what's gone on to get it to that point." The potential for using e-portfolios was discussed at this point.

The curriculum leaders noted that words such as 'assessment' and 'measure' have strongly established traditional meanings, and they wondered if Te Kura might need new words to describe new actions as part of the Education 3.0 plan, otherwise they foresaw that traditional perceptions and behaviours were likely to continue. One specific suggestion was to talk about *recording* rather than assessing. Another possibility is to use the term *documenting*. This is the solution the Ministry of Education chose for early curriculum debate about whether or not key competencies should be assessed (Hipkins, Boyd, & Joyce, 2005).

There was also some discussion on the challenges of assessment design, especially in relation to NCEA assessments. The curriculum leaders thought more work could be done in this area. One specific challenge posed was the need for tasks that are sufficiently open in their design to allow for the huge variety of contexts in which the school's disparate individuals are studying.

The affordances of digital ways of working

The examples presented during the workshop highlighted the multi-media nature of evidence of learning that can be sent in by students. Photographs and video, often accompanied by written accounts, were used to capture Te Kura students and/or their work at various stages in a learning process from prototype or ideas to product. Some presentations showed the progression of students' work and thinking across several iterations of a piece of work.

There was discussion about some of the kinds of rich information that these forms of media potentially provide. For example, curriculum leaders pointed out things about the learner and their environment, the place(s) they are living and learning, body language, etc. They saw the potential for e-portfolios to build rich, longitudinal stories about each young person as they traverse both school and life. One envisaged "a running journal of a person's learning that could run on

forever". An e-portfolio makes it possible to tag specific items in ways that allow future linking to reports of achievement. Key competencies could be tagged, for example, so that evidence of developing these can be traced across different subjects or learning contexts.

One presentation showed the kinds of materials that have been produced to make mathematics learning relevant to students in a range of different contexts, with an emphasis on using these skills to solve real problems and/or do meaningful things. These materials are carefully designed to support supervising adults to know what students need to do in order to have evidence of their learning signed off. This initiative could more explicitly build on the potential of distributed learning, which was introduced in section 2 as a key opportunity and skill set in 21st century ways of working.

Commentary

The thoughts and examples of the curriculum leaders, as just outlined, resonate strongly with the principles for assessment that can capture key competency development, as set out in the previous section. This provides a positive starting point for future innovation. The conversation was focused on innovative next practice and opportunities the move to OTLE might open up. These leaders have questions about how the various threads of opportunity might be woven together so that the whole is indeed more than the sum of the parts. This is very much a work in progress, but they are open to the conversation and excited by the possibilities.

What is not at all clear to us is what proportion of the teachers at Te Kura are thinking like these leaders. As we discuss shortly, the team leaders seemed more focused on pastoral care and matters pertaining to learning to learn. These aspects of learning are also important, of course, so this is not a criticism. But it does raise the question of how transformative curriculum thinking reaches down to the teachers in the various teams. We have no way of knowing how many of the teachers at Te Kura might be ready, willing and able to engage with transformative curriculum thinking, or to combine this thinking with a strong knowledge of students and their learning needs. These are challenges that would need to be addressed before some teachers could begin to engage appropriately with 21st century metrics and pedagogy. There is a clear need for rich professional learning that challenges their current beliefs and practice.

Another challenge will be thinking about, encouraging and supporting all the teachers and leaders to see themselves as ongoing learners, and to apply the same levels of self- and peer assessment to their learning, as they might in future be supporting students to do. We address this challenge in two ways in subsequent sections. First, we address the challenge of assessment-of-learning dispositions. Then we address opportunities for teachers and students to evaluate opportunities to learn and teachers' pedagogy.

7. Assessing opportunities to learn

Key points

Learning outcomes that meet the Education 3.0 agenda require teachers to purposefully orchestrate and support specific types of opportunities to learn. There is considerable consensus about the design principles that should guide the design and delivery of appropriate and effective learning opportunities.

New resources for OTLE need to be designed in ways that allow students to take up and develop intended Education 3.0 outcomes. However, design on its own is not sufficient. How teachers interact with students and respond to their learning is the key to opening up opportunities that allow students to stretch their growing capabilities.

This section describes several possible starting points for designing metrics that audit students' opportunities to learn. These include two research frameworks and a Ministry of Education-funded key competencies self-audit tool.

Rationale for this section

What teachers do to support each student will have an impact in multiple ways on the students' specific opportunities to learn. *NZC* acknowledges this important curriculum development dynamic by including a section on effective pedagogy. Evaluating students' opportunities to learn should be part of the overall strategic assessment plan.

This section discusses aspects of pedagogy that could potentially be in focus, and the associated pedagogical indicators might assure Te Kura that their students are being given opportunities to interact with learning tasks that do have the potential to develop and stretch their capabilities for living and working in 21st century contexts.

Opportunities to learn as a sociocultural idea

The idea of opportunities to learn has different implications when viewed through the lens of different theories for learning. Within a cognitive/individualist view of learning, the opportunity

could be said to be present if the teacher offers it. The joke saying 'I said I taught him: I didn't say he learned it' highlights the limitations of such a view.

Sociocultural learning theory points to the idea that actual opportunities for learning are contingent on a number of variables that will differ between individuals. These are things such as: how a student understands the nature of the task; whether they have the resources (language, knowledge, skills) to engage meaningfully with the task; whether and how they are able to access support when needed; and what sort of feedback they get that helps them persist and extend their learning (Gee, 2008).

A sociocultural framing of opportunities to learn underscores the importance of *pedagogy* as part of the Education 3.0 / key competencies mix (Hipkins, Bolstad, Boyd, & McDowall, 2014). The nature of the tasks on offer, what teachers do to support students to engage with those tasks, and what they focus on when giving feedback all become legitimate targets for gathering achievement metrics.

Assessing opportunities to learn: What are the options?

If we position OTLE as the common innovative learning environment within which Te Kura students learn, there are several evaluative options. Considerable research effort has been expended in identifying and describing effective pedagogy (i.e. pedagogy that maximises students' opportunities to learn). We now introduce ideas from three quite different projects that could provide starting points for designing metrics to audit this aspect of the design of OTLE tasks, and the ways in which teachers might work with these tasks to foster students' learning-to-learn and assessment capabilities.

Opportunities to learn and culturally responsive pedagogy

Among other potential influences, a sociocultural framing of opportunities to learn draws attention to the potential impact of students' cultural backgrounds on how readily they can access learning. In New Zealand, Te Kotahitanga teased out this dynamic in terms of its impact on opportunities for Māori students to learn. The research team arrived at the following set of key principles that would ensure students could access the learning opportunities being offered and experience success *as Māori:*

- manaakitanga: caring for students as Māori and acknowledging their mana
- mana motuhake: having high expectations
- ngā whakapiringatanga: managing the classroom to promote learning
- wānanga and ako: using a range of dynamic, interactive teaching styles
- kotahitanga: teachers and students reflecting together on student achievement in order to move forward collaboratively (Bishop & Berryman, 2009).

Principles such as ‘managing the classroom to promote learning’ obviously need adaptation in Te Kura’s context, but the broad thrust of these ideas could be a useful starting point to design ways to audit both learning opportunities and interactions with students.

McKinley & Gan (2014) drew on the work of the Te Kotahitanga team to discuss the challenges of developing culturally responsive pedagogy in different international contexts. They note that when under-representation of indigenous and minority students (in their case, in secondary science classes) is conceptualised as a problem of lack of participation and achievement, there is a tendency to look for solutions that are pragmatic, short term and patchy. These strategies are *added* to existing approaches rather than prompting substantive change in pedagogy. They argue for a different conception of where the problem actually lies: teachers need to acknowledge differences between students’ cultural identities and the culture of the (science) classroom and take a proactive approach in helping students to negotiate this cross-cultural environment. This implies that to engage in culturally responsive pedagogy, teachers need knowledge about the *nature* of the subject(s) they teach (in this case, the nature of science), as well as knowledge and cultural competency within indigenous communities. Teachers who position themselves as learners and build strong relationships with their students are more likely to succeed in developing cultural responsivity. Finally, McKinley & Gan note that a shift of this order needs to be carefully planned and supported at the *whole school level*, not left to individual teachers acting alone.

Principles for building innovative learning environments

The OECD[13] recently funded a project that explored the nature of innovative learning environments. This project began with a meta-review of research about how people learn. They then distilled these initial findings to shape a series of recommendations for practice. One set of recommendations identified seven key principles to guide the design and development of students’ learning opportunities (Dumont, Istance, & Benavides, 2012). These seven principles, from pages 6–7 of the summary report, are:

1. **learners at the centre:** the learning environment recognises the learners as its core participants, encourages their active engagement, and develops in them an understanding of their own activity as learners
2. **the social nature of learning:** the learning environment is founded on the social nature of learning and actively encourages well-organised co-operative learning
3. **emotions are integral to learning:** the learning professionals within the learning environment are highly attuned to the learners’ motivations and the key role of emotions in achievement
4. **recognising individual differences:** the learning environment is acutely sensitive to the individual differences among the learners in it, including their prior knowledge

[13] Organisation for Economic Co-operation and Development.

5. **stretching all students:** the learning environment devises programmes that demand hard work and challenge from all, but without excessive overload
6. **assessment for learning:** the learning environment operates with clarity of expectations using assessment strategies consistent with these expectations—there is a strong emphasis on formative feedback to support learning
7. **building horizontal connections:** the learning environment strongly promotes 'horizontal connectedness' across areas of knowledge and subjects, as well as to the community and the wider world.

Dumont et al. argue that, individually, these seven principles seem like common sense, but the challenge is that *all* of them need to be present to truly claim to be offering an innovative learning environment. This is much harder than targeting one or two principles, and not all of them are common practice as yet.

There are some specific challenges to be taken into account in the Te Kura context, given that this advice was probably prepared with more traditional schooling contexts in mind. For example, learning might or might not be a social experience for Te Kura students in their personal learning environment, but the nature of any interactions there will be largely beyond Te Kura teachers' control.

What would "well organised co-operative learning" opportunities look like in the Te Kura context? The answer could lie in the way virtual interactions between students, and between the students and their teachers, are designed and supported. However, careful thought is needed to determine the purposes for which these interactions might take place, and what the learning focus would be. One research programme makes the telling point that collaboration *per se* cannot be assumed to support positive subject learning gains or develop stronger thinking capabilities. For these things to happen, the learning experience needs to provide the opportunity to articulate and test thinking, rehearse one's own arguments and the counter-arguments likely to be made by others, and so on. Such interactions help learners clarify their own thinking and surface through patterns that might otherwise remain tacit (Kuhn, 2015).

A key competencies self-audit tool

In 2012 the Ministry of Education commissioned a small team of researchers from NZCER and the University of Waikato to develop indicators for the *NZC* key competencies. The Ministry requested a set of indicators that would help schools and teachers better integrate and monitor student development of the key competencies across a range of learning area contexts. The research team reasoned that an indicator framework, with dimensions that were easy to remember and work with, could make teacher decision making more manageable. It should also make progress or achievement easier to plan for, put into action and recognise within learning interactions.

The framework is based on three key ideas: initiative, connections and challenge (ICC). The following definitions have been taken from the website that hosts the tool.[14]

- **Initiative** for students is about their **agency** as learners. It takes into account ideas such as student voice, learning to learn, assessment for learning, two and three way reporting etc. Initiative is not a personality trait. In this framework it refers to the relationship between the student(s), their educational opportunities, and the ways they are able to take up these opportunities to advance their learning.
- **Connections** for students are about continuity and coherence. This strand of the framework is about purposefully building meaningful links within and across learning areas, between types of experiences and across a range of contexts including families, whānau and communities. It takes into account things like teaching in context, action learning, experiential learning, curriculum integration, transfer etc.
- **Challenge** for students is about learning that stretches them. It is about using, transforming, critiquing, and generating knowledge for purposes that students recognise as worthy of their effort. It includes the knowledge building processes relevant to a learning area (the 'nature' of the subject). It takes into account ideas such as personalised learning, meta-cognition, critical inquiry, subject specific (critical) literacies etc.

The self-audit tool poses a series of deceptively simple questions, carefully organised to focus attention on reciprocal relationships between key competencies and learning area content. Each column represents one of the ICC aspects: initiative, connections and challenge. The rows on the framework represent typical stages at which teachers think about aspects of learning action: before (i.e. planning), during (i.e. responsivity) and after (i.e. reflection and evaluation). The questions include many that thoughtful teachers are likely to ask already. They are compatible with the teaching-as-inquiry focus of *NZC* but are more specific in their focus. The framework is shown in Appendix 1.

Commentary

All three potential starting points outlined in this section are designed to support teachers' inquiry into their own practice. The feedback any new tool gives would be intended, first and foremost, to support and encourage teachers' professional learning and pedagogical growth.

Te Kura is uniquely placed in that the design of learning experiences is separated from their delivery—at least for those teachers who do not play an active role in building OTLE resources. There are two assessment possibilities here.

[14] http://nzcurriculum.tki.org.nz/Key-competencies/Key-competencies-and-effective-pedagogy/Self-audit-framework. Notice that this link makes a link to the effective pedagogy section of *NZC*. During the development of the resources on this site we found strong resonances between the advice in this section and the pedagogy of the innovative teachers with whom we were working.

- Any new tool could be adapted to audit the nature of the learning opportunities built into new units of work or applied to existing resources as they are adapted for the OTLE environment.
- The manner in which teachers respond to student work—and adapt learning experiences for students, both individually and in virtual collaboration—could also be audited to provide formative feedback to the teachers themselves.

It is important to reiterate that tools of this type should be used for formative purposes rather than for gathering accountability data. Throughout this report we have highlighted the complexity and multi-faceted nature of the shifts Te Kura is seeking to drive. Teacher learning—not just student learning—will determine the degree to which the school succeeds with its ambitious plans.

8. Assessing learning dispositions

Key points

Key competencies include important dispositional components that are not easy to assess. However, there are strong synergies between the idea of key competencies and the *NZC* principle *learning to learn.* This section outlines two tools designed to assess dispositions related to *learning to learn.*

One international tool is called CLARA. It provides powerful, instant feedback to learners, and teachers need to become accredited users so that they scaffold appropriate conversations about these results and next learning steps. This is a rich professional learning opportunity given that learning to learn has not been a traditional curriculum focus for teachers. CLARA assessment data would sit at the 'assessment for lifelong learning' level in Figure 1. Including this tool in the overall assessment plan would provide an opportunity to close the feedback loop to the more aggregated standardised levels of data lower in the diagram.

The other tool is a prototype student survey designed by the GELP collective.

Rationale for this section

There are strong synergies between the key competencies and the *NZC* principle *learning to learn* (Hipkins, 2015b). In this section we focus on some possibilities for deploying the idea of learning to learn as an assessment focus in its own right. Two tools are introduced, and their pros and cons are considered.

Sharing assessment decision making with students

The current national assessment policy document emphasises the importance of sharing assessment decision making with students so that they can learn to become better judges of their own learning and progress:

> All students should be educated in ways that develop their assessment capability within and across all learning contexts. Assessment capable students are able to actively participate in assessing their own learning, recognise important moments of personal learning, and make 'what next' decisions. (Ministry of Education, 2011, p. 25)

The concept of ‘assessment capability’ was initially proposed in the DANZ position paper (Absolum et al., 2009). More recently other researchers have picked up on this concept and described three conditions that need to be met simultaneously so that students can build their assessment capabilities:

- understanding what constitutes quality in the intended learning
- the requisite metacognitive skills to effectively evaluate their work
- strategies to modify their own work during its production (Booth, Hill, & Dixon, 2014, pp. 141–142).

The DANZ paper noted that the standards-based nature of NCEA provides rich opportunities for conversations with students about how learning will be assessed. Each achievement standard describes three potential levels of success for the specified aspect of learning: achieved, achieved with merit, and achieved with excellence. An exploration of the characteristics that differentiate excellent achievement from a demonstration of learning that only just reaches the minimum specified standard should help students come to a deeper understanding of the challenges of the intended learning and what counts as a high-quality demonstration of it.

Te Kura’s new learning materials could readily include annotated exemplars of work of different quality to support metacognitive conversations between teacher and student, or between students via blog postings, fostering students’ self-assessment capabilities. Some apps (e.g. Explain Everything) have the facility to voice record as students think aloud while making decisions about how to best tackle a learning task.

However, responses to the most recent national survey of secondary schools suggest that such conversations are not yet a regular feature of many teachers’ pedagogical repertoires (Hipkins, 2015b). Assuming this finding would also be applicable to the teachers at Te Kura as a specific group, the clear implication is that they will need effective professional learning related to learning to learn if they are to value and use any new materials well. One rich learning possibility for both students and teachers is outlined below.

A tool for gathering learning-to-learn metrics

One large international research programme has focused on the rapid prototyping of students’ learning-to-learn dispositions with their active involvement in learning conversations about the results. The survey that drives the analysis is derived from research and has recently been remodelled, streamlined and placed online.

The first-generation tool was called ELLI (the Effective Lifelong Learning Inventory). Participation in the survey generated visual feedback in the form of a spider diagram with seven subscales: critical curiosity; changing and learning; learning relationships; strategic awareness; creativity; meaning making; and resilience. Students could see at a glance where they had strengths and where they faced challenges to develop more robust learning behaviours and

dispositions (Deakin-Crick, 2014). Some students from minority groups developed memorable metaphors for the learning dimensions based on animals or things that were culturally important to them (Goodson & Deakin-Crick, 2009). This arguably constitutes an interesting example of culturally responsive pedagogy.

Recently the ELLI team undertook a robust reanalysis of the data from many thousands of students and adults. The researchers used structural equation modelling to check the precise nature of the relationships between the seven original scales (Deakin Crick, Huang, Goldspink, & Shafi, 2015). The new model that resulted shows internal relationships between the learning-to-learn dimensions with much greater clarity. In particular, the nature of what was initially called 'resilience' has been carefully rethought. The remodelled tool has been rebranded CLARA (Crick LeArning for Resilient Agency profile).

A GELP learner engagement tool

The GELP initiative has recently released a draft tool to assess student engagement with learning:

- some items probe aspects of learning to learn (as in CLARA)
- some items probe a student's perception of, and response to, opportunities to learn
- some items relate to high-level engagement with school
- some items relate to perceptions of the value of learning achievements.

There is a mix of focuses in this tool. Students might or might not respond coherently given that responses about different (but not unrelated) things are being elicited. The internal coherence of the tool, or not, should become clearer with time—it has no useful research-informed history as yet.

Commentary

CLARA could be a useful analytic tool for Te Kura to adopt, for several reasons.

- The tool is online and is backed up by data warehousing and an analytics platform that provides immediate feedback to students.
- Data can be generated for individual students or for whole groups: the object of the exercise is to generate an artefact that can become a focus for explicit metacognitive conversations between students and their teacher.
- Repeat use of the survey tool can allow students to track their personal progress in strengthening their learning-to-learn dispositions over time. There is evidence that students can actively grow and strengthen their learning-to-learn dispositions when they are supported to understand and apply their current learner profile to ongoing learning efforts (Deakin-Crick, 2014).

The robust metrics gathered by this tool offer another interesting possibility to fully close the feedback loop indicated in Figure 1. While ARBs data sit at the 'assessment for learning' level in Figure 1, data from CLARA would sit at the 'assessment for lifelong learning' level. However, careful research design processes would need to be developed to ensure relationships between different data sets were appropriately explored.

There are several practical caveats to be taken into account when deciding whether to use CLARA. The tool was developed to use as an adjunct to a student-led inquiry of their choosing. The development team see this as important because the meaning, purpose and direction for learning are under the student's own control. This condition would need to be taken into account when determining when and how to use the tool most informatively. Debating this question would open up an important curriculum design opportunity. Any rich personal inquiry has the potential to open up assessment to include parts of the curriculum for which there are currently no standardised assessment tools (i.e. learning areas in addition to English, maths and science). This could provide an important impetus for designing rich tasks that integrate learning areas, such as some of those outlined by the curriculum leaders in their recent workshop (see the previous section).

Students will get the most from the CLARA tool when teachers actively support rich metacognitive conversations. This implies that teachers will need to develop their own understanding of the tool and of the potential in such conversations. In other words, use of this tool could be one way of opening up professional learning about learning to learn.

Users of the tool must first become accredited by undertaking a training programme in the appropriate use of the tool. This training has not yet been offered within New Zealand (some school leaders have gone to the UK to take part). However, given the number of teachers at Te Kura, this would no doubt be negotiable. Several of the principal researchers are now based at least part time in Sydney, which could potentially enhance the prospect of establishing training courses in New Zealand. We do not know what the cost of the analytic services associated with the tool would be (though at the moment it appears to be free for use for 'research purposes').

Of the two tools, our preference is CLARA because of its robust, research-informed basis. Should Te Kura decide to adopt the GELP tool, however, there would be no access cost. But because it is new and in draft form, processes for data capture and reporting would need to be designed. However, a research programme based on any emergent results from the use of the tool might well be of high interest to the overall GELP collective.

9. Existing learning-to-learn opportunities at Te Kura

Key points

The team leaders who attended the workshop already place a strong emphasis on pastoral care and getting to know students as individuals in the context of their families, whānau and communities. The principles outlined in Te Kotahitanga were clearly in evidence during the conversation. These team leaders were aware of the importance of learning dispositions and would like to see data gathered to acknowledge positive instances of learner engagement and stretch.

The team leaders seem ideally placed to lead learning-to-learn initiatives at Te Kura. However, it will be important to establish processes for connecting their work to that of the curriculum leaders. Currently they appear to be considering quite different curriculum imperatives.

Learning-to-learn initiatives potentially open up important opportunities for families, whānau, iwi and hāpu groups to engage in dialogue about the learning they value for their young people.

Rationale for this section

In February 2015 we conducted a workshop with a representative group of Te Kura's team leaders. Participants were asked to come prepared to share a story or artefact with the group, in order to provide us with insights into how teaching and learning are planned for and carried out and how student learning is understood and assessed. Six team leaders volunteered to make a presentation. After each presentation the whole group discussed what had been presented.

It became clear to us during these conversations that a focus on learning to learn is integral to the pastoral support the team leaders give to students. This section discusses opportunities to link the learning-to-learn approaches outlined in the previous section to ways that some Te Kura team leaders are already thinking about their work.

Opportunities the team leaders perceived

Team leaders commented that there should be more opportunities for students to reflect on their learning and on themselves as learners. Often students come to Te Kura following a knockback in their schooling experiences, so they need to build a relationship with a teacher before they will

talk about their learning. It would also be good for students to see evidence of their own learning growth.

Team leaders saw advisories[15] as one opportunity to gather and discuss learning-to-learn data. However, some of them worried that students might become too dependent on a teacher to drive learning-to-learn conversations, whereas they really need to develop their own self-management and work independently. Participants were also concerned that only a small number of students attend and receive the benefit from advisories. They would like to see more widespread involvement of Te Kura's students.

One specific challenge debated during the workshop was that co-constructed learning opportunities, such as those presented at the workshop, are currently not being recognised in a formal way. There is evidence that some students are actively taking part in shaping their learning directions, but this is not documented.

The group noted the cross-curriculum focus of learning opportunities they discussed. A specific example was weaving NCEA literacy and numeracy with other subject learning. They said there should be more data sharing and discussion about authentic cross-curricular learning opportunities.

Participants also said that Te Kura should recognise that assessing and reporting via NCEA credits is inappropriate for many of their students. Several alternative types of outcomes were suggested as potential assessment targets. Below the suggestions have been clustered into similar types of outcomes:

- engagement, involvement, commitment
- communication
- development of narratives or a dialogue about learning
- enlisting and giving whānau or community support, or social responsibility/respect
- cultural competencies
- social competencies and personal growth
- monitoring the goals set and the progress made towards meeting these.

Thinking back over the workshop, one person noted that the examples presented were largely about face-to-face learning. The team leaders found this interesting given that Te Kura is a distance learning organisation. It was food for thought that during the day there had been almost no talk about the school's push towards online learning, or the dilemma that the students most at risk of not achieving are the ones least likely to be able to access online work.

[15] Regionally-based face to face meetings between Te Kura teachers and students.

Commentary

These presentations and the shared conversations highlighted the strong emphasis that team leaders, when in the role of learning advisers, place on pastoral care, the importance they attach to getting to know students as individuals, and the challenges in providing students with sound advice and support (e.g. during learning advisory regional events).

The overall tenor of this conversation was quite different to that which took place during the curriculum leaders' workshop. If Te Kura chooses to gather metrics related to students' learning dispositions, as outlined in the previous section, the team leaders would appear to be well placed to undertake the initial professional learning and then to lead the implementation. They are already advocates for these types of outcomes and clearly value them. We are not sure how much the focus on learning dispositions, which was so strongly valued by the participating team leaders, is shared by others in the same or similar roles, or by the teachers in the teams they lead. It is also not clear how this focus on dispositions sits in relation to the focus on learning area outcomes highlighted by the curriculum leaders. The overall assessment/evaluation plan needs to address these coherence and integration challenges.

Compared to students in traditional secondary schools, some Te Kura students enjoy greater support and involvement from parents and whānau. This could also provide an interesting opportunity to collect evidence of achievement of different sorts of outcomes—such as learning-to-learn outcomes—because these adults, who know the students so well, can be more readily involved in conversations about their learning. Feedback from the Te Wāhanga representative on NZCER's internal advisory group pointed to another strong rationale for drawing parents into conversations about learning to learn, and beyond that to other curriculum goals. Whānau, hāpu and iwi aspirations for their tamariki are important, but how much does Te Kura know about these aspirations? This question is challenging enough when applied to the traditional curriculum, but it becomes even more so when 21st century learning outcomes are considered.

The whole group noted that specific examples of formative assessment practices were an 'absent presence' during the workshop with the team leaders. It may be simply be that the stronger imperative was to discuss how relationships are built with learners and the importance of seeing learners in the context of their wider settings and circumstances. However, since so much of what Te Kura aspires to achieve hinges on strong formative assessment practice (see section 4), professional learning in this area will be a precondition to the successful implementation of any new metrics selected. The interesting additional opportunity here will be for participating Te Kura teachers to reflect on their own learning-to-learn challenges and experiences.

There could also be an interesting opportunity to build strong examples of effective curriculum integration by using the close connections between the secondary teachers based in the smaller regional hubs. It would appear that they are already having these types of conversations informally, simply because they are working closely together. The CLARA tool is designed to be used with rich inquiry pedagogy because it is important that students drive the learning they are

reflecting on. These small regional teams might be ideally placed to design and trial such inquiries.

10. Next questions and recommendations

Key points

Continuing with relatively traditional learning programmes, albeit with adjustments to how learning is assessed, will not adequately address the *NZC* vision for a 21st century curriculum.

Building and deploying the OTLE online repository of new curriculum resources provides a timely opportunity for Te Kura to build on and extend current efforts to design a school curriculum that is responsive to *NZC*'s 21st century signals.

It will be critical to determine which types of change to prioritise. Deep curriculum change will prompt a need for assessment change, but change is unlikely to work as well in the reverse direction.

No change will be effective unless it is accompanied by ongoing opportunities for rich teacher professional learning across the whole Te Kura staff collective.

Creating a coherent assessment plan is an important next step. This plan should make clear connections between the different tools so that intentional coherence in the system is evident to all users of these tools (teachers, students and parents/whānau).

Rationale for this section

This section draws the threads of the report together in the context of high-level challenges indicated by the wider research literature and our conversations with curriculum leaders and team leaders from Te Kura. It will be clear from the preceding sections that the changes Te Kura chooses to implement must be understood and 'owned' in the first instance by the teachers who will drive the assessment processes. For this reason, the emphasis in this final section is on planning strategic ways to shift teachers' professional practice.

Shifting professional practice in the context of a still-evolving national curriculum

The quest for Education 3.0 metrics acknowledges the need to change what we value, and hence assess, in young people's learning, both at school and beyond. Here in New Zealand we have a curriculum framework (*NZC*) that signals this shift towards so-called 21st century curriculum

thinking. However, this is a complex set of shifts that have implications for many taken-for-granted aspects of traditional teaching and learning. Not surprisingly, understanding and responding to these signals has proven to be a slow and patchy work in progress in schools across New Zealand (Hipkins et al., 2011).

High-stakes assessment policies and instruments (e.g. secondary school NCEA achievement standards, primary school National Standards) are seen by many—but by no means all—school leaders and teachers as perpetuating 'business as usual' in 20th century curriculum terms. Reconciling high-stakes assessment and profoundly changed national curriculum directions is very much a work in progress.

Te Kura has the potential to enhance its design of a school curriculum that is responsive to *NZC*'s 21st century signals as it builds and deploys the OTLE online repository of new curriculum resources. However, it will be critical to determine which type of change should come first. Should new learning resources provide opportunities for student *and* teacher learning, subsequently driving changes in teachers' curriculum thinking, which would in turn highlight and drive the need for changes in assessment procedures and ways of responding to students? Or would built-in assessment innovation short-circuit this lengthier process by upping the ante in ways that drive more immediate changes in how teachers think about and enact the school's curriculum?

The latter response is tempting, especially given the slow uptake of *NZC*'s 21st century sensibilities across the schooling system as a whole. However, the unfolding of significant change initiatives elsewhere would suggest that the more rapid change option might not work out as intended. For example, one large-scale, research-based professional learning initiative in the UK sought to shift teachers' classroom-based assessment practices so that they became more adept at building assessment-for-learning opportunities for students. Some teachers in the participating schools implemented changes to the 'letter', but not in the 'spirit' of what was actually intended. While they did things and responded to students in ways that were superficially aligned with the new practices introduced, they did not deeply engage learners in meaningful conversations about their learning and its next steps (Mansell, James, & Assessment Reform Group, 2009). This example is salutary given that assessment for learning is a feature of most 21st century frameworks (section 4) and is a central feature of innovative learning environments (section 7). The counterexample here points to the advisability of first building new *curriculum* and *pedagogical* thinking, with assessment shifts the logical consequence rather than the driver of change.

Our recommendation

All Te Kura teachers will need opportunities for ongoing, challenging professional learning that extends and deepens their understanding of *NZC*.

They need opportunities to explore different types of learning outcomes and the associated implications for how they interact with students and their families. This will help ensure new assessment tools make more sense to all the teachers and hence will be used in the spirit intended.

Thinking holistically about future-focused change

A recent review of existing future-focused literature and research pointed to six emerging principles, all of which have implications for teachers' curriculum thinking and associated assessment practices (Bolstad et al., 2012). The following is a brief summary of these principles.

Learning should be personalised: the logic of the system is reversed so that learning programmes are built around the specific learning needs of the student rather than requiring them to fit into the existing system.

Ideas about equity and diversity need to be rethought: instead of a problem to be managed in the interests of offering an equitable education to all students, diversity should be seen as a learning resource to be fostered, and working with diversity an important outcome of learning.

Rethinking the role that knowledge plays in learning: it is no longer sufficient to absorb and reproduce existing knowledge: students need to develop their capabilities to work with disciplinary knowledge to create new knowledge that addresses specific real-world issues and challenges.

Roles and relationships between teachers and learners are restructured: teachers need to work with students to draw out and develop the strengths and interests that students bring to their learning. This entails learning for both sides of the partnership.

A culture of continuous learning is fostered for everyone: teachers' needs as adult learners are also appropriately addressed so that they are well supported to address the changes implied in the other four principles.

Strong school–community connections need to be fostered: the support of many others is needed if students are to be offered the sorts of authentic learning experiences valued in 21st century approaches such as capability building. At the same time, communities need to understand and value the sorts of shifts that schools are attempting to make.

These principles resonate with many of the recommendations introduced in the earlier sections of the report. What they *add* is that they collectively challenge traditional thinking about purposes for learning, and also about what learning is and where it can happen. There is much for all the participating adults in any learning context to explore and rethink.

As the OECD noted for its innovative learning environments principles, it is likely that all six of these future-focused principles will need to be in play simultaneously for real change to occur. The advisability of each on its own seems obvious; enacting all six together ups the ante considerably. Collectively they carry the clear implication that continuing with relatively traditional learning programmes, albeit with adjustments to how learning is assessed, will not adequately address the *NZC* vision for a 21st century curriculum.

Some Te Kura teachers are already thinking about, and are excited by, some parts of the overall shift. What is not clear is whether these innovative leaders are aligning learner-centred concerns (the remit, it would seem, of the team leaders) and curriculum innovation (the remit of the curriculum leaders). Nor is it clear how far beyond these leaders any type of innovative curriculum thinking has actually spread.

Our recommendation

There is an immediate need to consider how to effectively integrate curriculum and team leaders' knowledge to support a deep synthesis of the enacted curriculum across the whole teaching staff.

Finding a key change driver

The report has introduced a range of possible assessment targets, processes and tools. We chose options that bring with them the potential to create rich entry points for professional learning conversations with teachers. They also collectively offer the potential to close the feedback loop between different purposes for assessment (Figure 1), building a robust assessment plan where the whole could indeed be more than the sum of the parts.

There are other options we could have chosen to include but did not. For example, the GELP team has recently funded an exploration of the challenges of assessing creative thinking (Lucas, Claxton, & Spencer, 2013). We have a personal interest in the assessment of systems thinking (Hipkins, et al., 2014), which was also a focus for Jay Lemke's team (Lemke, Lecusay, Cole, & Michalchik, 2012). Also, like Lemke's team, we are interested in 'gamification', which opens up possibilities to build 'stealth assessments' into the game-like features of learning resources. These exciting and innovative options have considerable potential for the future, but we think it is important to address change in traditional curriculum thinking and assessment practices first. More ambitious changes can follow, but probably cannot productively *lead* initial deep shifts in curriculum thinking and associated pedagogy.

Te Kura leaders now need to debate which of the possibilities outlined in this report would be most likely to capture the hearts and minds of the teaching staff so that they engage with conviction in the *spirit*—not just the letter—of curriculum and assessment change.

Our recommendation

A strategic assessment plan should be created and carefully sequenced so that the impetus for change is maintained but is not overwhelming.

Ensuring coherence at the system level

NZCER has recently completed work for the Ministry of Education on potential ways to assess international capabilities (Bolstad, Hipkins, & Stevens, 2014). This has strong parallels with, and borrows from, our knowledge of the challenges of assessing key competencies (section 5). It provides a useful lens for asking system-level questions about purposes for assessment. Bolstad et al. identified the following as important questions to ask about the *purposes* for which metrics about students' capabilities might be gathered, alongside and intertwined with the *means* for doing so:

- Who wants to know and why (for what purposes will assessment feedback be used)?
- Does everyone understand [the thing to be assessed] in the same way, and therefore agree on what sort of data might best be captured?
- Could data gathered to inform teaching and learning in local contexts be adapted and reframed for accountability purposes?
- How might the sense that learning is a journey be captured?
- How might individual learners' opportunities to become more capable be reconciled with the affordances of the contexts in which that learning takes place?

Bolstad et al. posed these questions to the Ministry of Education to draw attention to the challenges faced in designing a *coherent* curriculum and assessment system. That same challenge exists at all levels of the system, so questions such as these will also be important to factor into Te Kura's ongoing curriculum thinking and implementation.

Our recommendation

The assessment plan should make the connections between the different tools clear for all users of these tools (teachers, students and parents/whānau).

Teachers will need support to use the tools chosen to build a coherent picture of each student's overall learning progress.

A place for external advice?

The best-evidence synthesis on teacher professional learning draws attention to the important role played by 'outside' expertise if professional learning is to unsettle existing assumptions and really

move teacher thinking and practice (Timperley et al., 2007). Indigenous ('inside') change is more robust and sustainable when a trusted, insightful external mentor holds a critical mirror up to current practice (Heckman & Montera, 2009). As earlier sections have discussed, there is much to learn about the effective use of assessment tools deployed within an overall Education 3.0 agenda.

In our experience, the current emphasis on the use of cycles of teacher inquiry, and networked inquiry across schools, as key drivers of professional learning makes the need for critical friends or mentors especially acute. Despite the best of intentions, teachers are not researchers, nor do they want to be. They need considerable support to design robust, evidence-informed inquiries that engage them and really can drive changes in curriculum and assessment practice.

External advisers would need to have the expertise to design assessment processes and practices that enable and support system-wide as well as individual learning for both students and teachers. The ability to adapt existing tools, as needed, and design data-informed inquiries that link feedback from tools at different levels of the system would also be helpful.

Our concluding recommendation

We recommend that, as soon as possible, Te Kura host a workshop at which this report is debated and the various options for action are prioritised.

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Appendix 1: Assessing opportunities to learn: A simple self-audit tool

The ICC self-audit tool as presented on Te Kete Ipurangi (TKI)[16]

	Taking the Initiative	**Building Connections**	**Being Challenged**
Design	Which key competency do I plan to foreground and why? How will students know what my purpose is?	What relevant prior experience and knowledge might students have already? How do I plan to check?	What specific learning opportunity could this key competency/Learning area mix create?
In action	How am I modelling and encouraging the capability I want my students to build?	Are/how are students identifying relevant connections to other learning and prior experiences?	Have I got the right balance between challenge and capability? How do I know?
Future focus	How have my students and I identified and documented their learning gains?	How might students use their strengthened capabilities in other contexts? What will support them to do so?	What new insights about the challenges and opportunities in this subject might my students take forward?

An advantage of using this self-audit tool is its ready availability. It is on Te Kete Ipurangi (TKI) so can be accessed by teachers anywhere. The simplicity of the questions is also potentially an advantage: they should be readily understood. However, this is also potentially a disadvantage if the meaning of the questions is over-assimilated. Teachers could think 'We already do that' when in fact they don't. As section 3 also mentioned, this has been a persistent challenge for deploying key competencies as drivers of real curriculum change (Hipkins, 2012).

This tool is likely to be more effectively used when supported by professional learning that helps teachers dig beneath its surface simplicity. It is supported by a suite of examples of actual practice. Even though these are classroom-based, and therefore not necessarily directly applicable for Te Kura teachers, they also pose discussion questions that could be productively used or adapted for professional learning.

[16] http://nzcurriculum.tki.org.nz/Key-competencies/Key-competencies-and-effective-pedagogy/Self-audit-framework

Appendix 2: The prototype GELP Learner Engagement Survey

GELP Learner Engagement Survey
March 2014

Target age group: 13-15

Each questions to be answered on a 5 point scale: strongly disagree, disagree, don't know, agree, and strongly agree.

1. I am interested in what I am learning at school
2. I am usually bored at school
3. I learn more outside school than at school
4. What I learn in school is relevant to my life
5. I talk to other people about what I am learning at school (e.g. family members)
6. I like being at school
7. I do lots of hands-on activities at school
8. For my school work, I sometimes learn from people outside school (e.g. a member of the community)
9. At school, I try hard to do my best work
10. I receive useful feedback about my progress at school
11. I carry on learning when I am not at school
12. I talk to other students about school work
13. If I am not happy with my school work, I usually try to do it again
14. I feel pleased with myself when I do well at school by trying hard
15. At school, I spend a lot of time pretending to pay attention
16. I often find myself thinking about what we are learning after a lesson is over
17. I do as little work as possible at school; I just want to get by
18. I feel I am being well prepared for life after school
19. My friends think school is important
20. School is helping me become the person I want to be
21. At the end of the day, I can remember what we learnt about in school that day
22. I don't really care about school anymore