The Nature of the Key Competencies

A Background Paper

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1. Introduction to the key competencies

This paper explores the nature of the five key competencies proposed in the draft of New Zealand's revised national curriculum. While the selection and definition of these competencies is briefly outlined below, it has been more fully documented elsewhere (Brewerton, 2004a; Rutherford, 2005). The purpose of this paper is to contribute to the development of a shared understanding of the nature of the five key competencies, as they have now been described, by those who work in or with the school sector. Oates (2001) suggests that success in introducing competencies into the curriculum will depend on the development of such shared understandings and so this paper aims to:

- link each competency to appropriate broad areas of theory and research relevant to that
- competency;
- provide practice-linked insights into the nature of each competency;
- demonstrate ways the competencies could integrate with each other, both theoretically and in
- practical classroom applications, to emphasise their holistic nature; and
- provide a catalyst for wider professional conversations about the key competencies by
- identifying areas in need of further discussion and debate.

Following the brief introductory outline of the shared characteristics of the competencies, each one is more fully described in its own separate section. A final section outlines issues for further discussion that emerge from these descriptions.

Beginning at the beginning: why competencies, not skills?

Key competencies are intended to replace the "essential skills" of the current curriculum framework. There have been eight groupings of these skills (Ministry of Education, 1993, pp.17-20):

- **Communication skills**: which include an ICT component as well as more traditional reading, speaking, and writing skills;
- **Numeracy skills**: which include use of graphs, charts and tables, and calculators alongside other mathematical skills;
- **Information skills**: that focus on finding and making appropriate use of information;
- **Problem-solving skills**: that emphasise both thinking, doing, and evaluation;

- **Self-management and competitive skills**: with one focus on goal setting and self-discipline and another on managing practical aspects of daily living;
- **Social and co-operative skills**: with a focus on appropriate participation in group contexts, including as a responsible citizen in wider social settings;
- **Physical skills**: for fitness, sport, work, and leisure; and
- **Work and study skills**: for developing increasing responsibility for one's own learning.

The generic skill clusters summarised here were interpreted differently for each curriculum area and were supposed to be integrated into learning, along with "content". The National School Sampling Studies (see for example McGee *et al.*, 2003), commissioned as part of the Curriculum Stocktake process, found that the reality fell short of the ideal. Long skills lists, often placed near the end of the individual curriculum documents, were seen as an add-on, or ignored completely, if they were not seen as directly relevant to a specific curriculum area. The Curriculum Stocktake recommended a reduction of the long lists, and the inclusion of *attitudes* and *values* with the skills to better reflect their generic importance to all curriculum areas.

In her paper on the key competencies, Melissa Brewerton described three important government policy influences that led to the Curriculum Stocktake recommendations being further developed and "skills" replaced with "competencies" (Brewerton, 2004a). Students were now seen to need to be able to:

- participate appropriately in an increasingly diverse society;
- use new technologies; and
- keep on learning in order to cope with rapidly changing workplaces (so-called lifelong learning).

While the essential skill "work and study habits" did mention the idea of lifelong learning, skills per se can never be an adequate response to this goal because people have to *want* to do these things. Thus a focus on *dispositions* was an important part of the shift from skills to competencies. Unlike skills, competencies focus on all the requirements of a task and this includes what you need to know, not just what you can do. Accordingly, knowledge was also brought into the definition:

- Competencies include the skills, knowledge, attitudes and values needed to meet the demands of a task;
- Competencies are performance-based and manifested in the actions of an individual in a particular context; and
- Key competencies are defined as those competencies needed by everyone across a variety of different life contexts to meet important demands and challenges (Brewerton, 2004a, p.2).

Defining the actual key competencies

The idea that curriculum development across a range of differing national contexts could be guided by the identification of a common core of key competencies originated with work carried out by the OECD (OECD, 2005). The OECD's purpose in producing the list below was to align the underpinning educational assumptions of its various monitoring instruments (for example the PISA assessments of mathematical, reading, and scientific literacy and problem solving). A project to define and select competencies (DeSeCo), grounded in existing OECD educational survey work, produced the following list:

- Functioning in socially heterogeneous groups;
- Acting autonomously; and
- Using tools interactively.

To these "thinking" was added as a "cross-cutting" key competency. This means that it is included as an aspect of all of the other three competencies (OECD, 2005).

This work aligned well with discussions on the redevelopment of New Zealand's "essential skills", as outlined above. Education policy analysts saw advantages in aligning New Zealand's curriculum to the intent of the key competency initiative (Rutherford, 2005). Because our school students take part in OECD monitoring programmes such as PISA, the results of these international tests can potentially provide valuable information about the success of our domestic educational policy initiatives. Obviously, the more closely our curriculum aligns with the OECD's model, the more directly relevant such evaluations will be. Another benefit for introducing key competencies was also anticipated. They were seen as a means by which the otherwise quite different educational contexts of early childhood, school, and tertiary sectors could be better aligned with each other. The way this worked out in practice will be outlined shortly (see for example Ministry of Education, 2005).

Over the course of extensive discussion and consultation, the DeSeCo descriptions were adapted to give them a "New Zealand" flavour and meet our national curriculum needs (Rutherford, 2005), as shown in Table 1.

Table 1 **A comparison of New Zealand and OECD key competencies**

New Zealand version	OECD version
Using language, symbols, and texts	Using tools interactively
Managing self	Acting autonomously
Relating to others Participating and contributing	Functioning in socially heterogeneous groups
Thinking	(Thinking as a cross-cutting competency)

The New Zealand model places "thinking" as a separate competency in its own right, in view of the argument that *all* the competencies interact with each other in the situations in which they are

used (Brewerton, 2004a; Rutherford, 2005). The importance of thinking to each of the other key competencies is reflected in the structure of this report, where it is addressed first. Discussion of the other four competencies then identifies their links to thinking.

The nature of "key" competencies

While learners may draw on a wide range of competencies, those labelled as "key" are seen to be *universal* rather than situation specific. The DeSeCo project defined them as the things all people need to know and be able to do in order to live meaningfully in, and contribute to, a well functioning society. While any one task will also require certain situation-specific competencies, key competencies are needed across a wide range of situations. The *curriculum* challenge that follows is that every learning area will need to demonstrate how the key competencies are specifically manifested *in that area*. To that end, this paper draws on a range of curriculum contexts when providing illustrative examples of the key competencies.

Rychen and Salganik (2003), the researchers who documented the DeSeCo project, describe key competencies as *complex*, and as demonstrated in *real contexts*, where learning requires students to draw on cognitive and other types of abilities. They combine the more traditional focus on curriculum *knowledge* with the use of appropriate *skills* and *values*. In this way, they integrate all these aspects of curriculum. Again, the curriculum challenge will be to show how this might happen in each learning area, as well as in integration between learning areas where relevant. The issue of integration is discussed in the section on "participating and contributing" because it is thrown into sharpest relief when considering students' use of the competencies to carry out authentic tasks. Participating and contributing is the competency discussed last because it also draws together and integrates all the other key competencies.

In a theoretical analysis of the key competencies commissioned for the Curriculum Marautanga Project, Margaret Carr emphasises their strong *dispositional* focus. They include *attitudes*, along with knowledge, skills, and values (Carr, 2004b). This focus draws attention to aspects of students' learning such as:

- recognising when it is relevant to draw on particular skills, knowledge, and values (being ready);
- being motivated to use these to achieve the task at hand (being willing); and
- knowing how to do so appropriately (being able).

This focus on dispositions connects the key competencies initiative with the idea of "*lifelong learning*". The disposition to continue learning in the years beyond school is seen as one important outcome of education for life in the "knowledge society" of the twenty-first century (see for example Gilbert, 2005). The focus on dispositions also helps make meaningful links between the five key competencies and the five strands of Te Whāriki, the New Zealand early childhood curriculum, as shown in Table 2.

Table 2 **Links between the key competencies and early childhood education**

New Zealand key competencies	Strands of Te Whāriki
Using language, symbols, and texts	Communication
Managing self	Wellbeing
Relating to others	Contribution
Participating and contributing	Belonging
Thinking	Exploration

This table shows that the strand called "belonging" in Te Whāriki becomes "participating and contributing" for the school curriculum. As Table 1 showed, the originating DeSeCo key competencies did not differentiate between relationships with others and actions taken. However the co-construction process followed in the Curriculum Marautanga Project highlighted the central role seen for identity, wellbeing, and belonging as important enablers of learning. While there have been calls to retain the name "belonging" in the school curriculum (see for example Carr and Peters, 2005) the change of title reflects vigorous debate about whether this is an *outcome* as well as a precondition for learning (Rutherford, 2005). Brewerton (2004b) argued that participation is a more important influence on learning than belonging (p. 19) and this is reflected in the name finally chosen.

Illustrating the strongly interconnected nature of the competencies, discussion of this issue in the tertiary sector led to the model shown in Table 3. The 2003 DeSeCo outline of key competencies describes "acting autonomously as: acting within the big picture or the larger context, forming and conducting life plans and personal projects, and defending and asserting one's rights, interests, limits and needs (Rychen, 2003, p.92). "Managing self" in the New Zealand tertiary array aligns with the last two of these while "participating and contributing" aligns with acting within the big picture or the larger context. For the New Zealand tertiary education version, thinking is retained as a separate rather than a cross-cutting key competency.

Table 3 **Links between the key competencies for school and tertiary sectors**

School key competencies	Tertiary sector key competencies
Using language, symbols, and texts	Using tools interactively
Managing self Participating and contributing	Acting autonomously
Relating to others	Operating in social groups
Thinking	Thinking

As well as curriculum challenges, there is an important *assessment* challenge associated with the inclusion of attitudes and values within the key competency model. Rychen and Salganik (2003) describe this challenge as follows:

> A competence is manifest in actions, behaviours, or choices in particular situations or contexts. These actions, behaviours, or choices can be observed and measured, but the

> competence that underlies the performance, as well as the multiple attributes that contribute to it, can only be inferred (Rychen and Salganik, 2003, p.48).

The issue of how to assess students' learning progress as they deepen and widen their competencies is not the main focus of this paper, and has been discussed elsewhere (Hipkins, Conner, and Neill, in press). It is, however, important to reiterate two things:

- Because of their holistic nature, assessment of key competencies requires a demonstration of an actual performance in a real context; but
- Knowledge remains important—*how* it is assessed may be matter for debate, but *that* it should be assessed is not in question.

Do the key competencies reflect the diversity of New Zealand's population?

There have been some suggestions that the DeSeCo work was too focused in Western European cultural values. Addressing this issue, Carr and Claxton (2002) note that dispositions reflect culturally determined values. For example, some cultures value co-operation over competition. Rychen and Salganik (2003) suggest that the differences may not be in regard to the types of generic competencies but rather in the weight given to them, or the way they are interpreted, between cultures. Paul Keown and his team at the University of Waikato addressed this issue in his background paper on values for the New Zealand curriculum. Following a literature review and extensive community consultation he recommended a "big tented" approach in which overarching shared values are interpreted locally, as appropriate, in different cultural contexts (for the literature review see Keown, Parker, and Tiakiwai, 2005). Again, the specifics of this debate are beyond the scope of this paper but are seen as important to the overall interpretation of the key competencies in the New Zealand context.

A theoretical framework for the key competencies

As outlined above, descriptions of the key competencies emphasise their holistic and contextual nature. Brewerton describes this curriculum initiative as:

> …taking an ecological or 'contextualist' approach to learning and living, where young people's learning is seen to be influenced by the various contexts of their lives (microsystems), the interactions between the contexts (mesosystems), and by the secondary and wider influences on those contexts (exo- and macro-systems). This perspective reflects the widely supported ecological approach of Brofenbrenner that underpins NZ early childhood education as expressed in Te Whāriki: Early Childhood Curriculum (e.g. Nuttall, 2003, 8–9). It also reflects the sociocultural perspective on learning, which suggests all learning is mediated through cultural tools, primarily language (Brewerton, 2004b, p.7).

The identification of sociocultural theory as an underpinning framework has several important implications for the descriptions of the key competencies, and for their implementation as the central heart of the curriculum. Key aspects of this theoretical framework are briefly sketched here, then discussed in more detail as relevant to the various competencies.

Taking contexts of learning into account

Within a sociocultural theoretical framework *contexts* and *relationships* are seen as very important aspects of learning. The context of school is characterised by *cultural* values and ways of doing things that are more familiar to some students than to others. Aspects of school culture can be so pervasive and transparent that they are seen as "normal" even though, from other cultural perspectives, that might not be the case at all. The key competencies, with their focus on reflection, challenge both teachers and learners to think carefully about the ways in which aspects of culture impact on learning.

Similarly, within a sociocultural framework pedagogy is seen as learner-centered, whereas within a more traditional school framework teaching might be seen as content-centered. Teachers often ask why the term "pedagogy" is used and not just "teaching". Davis (2004) provides a helpful definition. He says that the term pedagogy is "more a reference to the teacher's *interpersonal* competencies, and is thus used to refer to the moral and ethical—as opposed to technical—aspects of the teachers' work with learners" (pp. 143–144, emphasis added). From a sociocultural perspective, relationships impact on learning and need to be taken into account. This can be particularly challenging when students come from different cultural backgrounds to their teachers. Effective ways of structuring teaching to take account of the learning needs of the diversity of learners in any one class was the inquiry focus of the first Best Evidence Synthesis (BES) (Alton-Lee, 2003). While it is not possible to revisit all of the ideas within the scope of this first BES, some aspects are referred to in the sections that follow.

The ideas of situated and distributed learning

From the perspective of sociocultural theory, learning is seldom the act of an isolated individual but is accomplished in *social situations* where the tools of a culture are being employed. This is reflected in the theoretical idea of *situated learning*. The tools of a culture carry with them important aspects of prior learning. This is obvious for books and other cultural tools that convey ideas as language, but can be applied more widely. The section on "relating to others" expands on this idea, to show how a focus on the social aspects of learning can enhance outcomes for all students. Again, a focus on "meta" levels of learning helps students see the meaning-making impact of the cultural tools that are used. This idea is expanded on in the "using languages, symbols, and texts" section.

From the sociocultural perspective, a lot of the meaning (and hence potential learning) in any situation is embedded in the artefacts in use, as well as in the people and their interactions. The design of a well-made carpentry tool, for example, reflects all that has been previously learned

about the challenges of carrying out the task for which it is designed. These do not have to be learned anew by each new user, although obviously they do need to learn to skilfully use the tool itself. This idea is reflected in the theoretical concept of *distributed cognition*. Carr (2004a) explains it thus:

> Learning is distributed across the resources of self, other people, cultural tools, and community. Learners need skills for accessing and developing these resources and for recognising their purpose over place and time (Carr, 2004a, p.8).

If competency is seen not to reside in individuals alone there are implications for the role of the teacher and for assessment. As already noted, each of the following sections includes a discussion about ways teachers can support learning of the relevant competency under the heading "opportunities to learn". This acknowledges the central importance of conditions for learning, for which the teacher and student *together* are responsible, but to which other people and many cultural artefacts may also contribute.

Assessment as adaptation

Although this view is often implicit, assessment is often carried out *as if* there is an assumption that what is learnt and known in one context is useful because it can be produced and used in another context when needed—the so-called idea of "transfer" of learning. Situated and distributed views of learning raise interesting questions about the types of assessment that assume transfer, especially of "content" recalled under solitary test conditions. The issue is even more challenging when what is being assessed are competencies that imply some sort of action (in addition to knowledge recall). If meaning is bound up in a specific situation, and distributed across all the resources of that situation (both people and things) can we expect that competencies demonstrated in one context will be able to be usefully transferred to another? Carr and Claxton (2002) suggest that dispositions are *both* transferable and situational. Rychen and Salganik (2003) conceptualise the ability to transfer learning to new situations as "adaptation". Adaptation entails:

> actively and reflectively using the knowledge, skills or strategies developed in one social field, analyzing the new field, and translating and adapting the original knowledge, skills or strategies to the demands of the new situation (p. 48).

In this view, competencies can only be assessed when the assessment situation allows for adaptation to a new context to be demonstrated. Carr (personal conversation) says there is a second aspect of the demonstration of competency when the context changes. As well as being able to adapt existing knowledge, skills, and values to new situations, learners must recognise situations where the demands of a new context cannot be met by adaptation alone. New aspects of the learning task must be able to be ultimately *reconciled* with existing knowledge in ways that acknowledge difference without wishing to eliminate it. The differences to be reconciled are very likely to relate to matters of culture and "ways of doing things here". Etienne Wenger (1998, pp.160-161) writes that:

> (W)hen a child moves from a family to a classroom, when an immigrant moves from one culture to another, or when an employee moves from the ranks to a management position, learning involves more than appropriating new pieces of information. Learners must often deal with conflicting forms of individuality and competence as defined in different communities…. I am suggesting that the maintenance of an identity across boundaries requires work and, moreover (this work)…is at the core of what it means to be a person.

Wenger describes this bridging process as one of "reconciliation", which he says is about "finding ways to make our various forms of membership coexist, whether the process of reconciliation leads to successful resolutions or is a constant struggle".

Haskell (2001) describes a "spirit of transfer" that is influenced by traits such as persistence, locus of control, confidence, anxiety, fear of failure. He says it is important that the issue of willingness to transfer is not seen as a concern for the individual alone but rather that a "culture of transfer" should be created in the classroom by setting up the conditions that foster this willingness. In this way, assessment issues are also linked to opportunities to learn which, as we have seen, is an important underpinning aspect of sociocultural theory.

Reflection and metacognition

"Reflectivity" is a cross-cutting theme across all the key competencies. Rychen elaborates this as flexible thinking across social fields, with recognition of the dynamic relationship between the individual and society, and an expectation that learners will construct their own knowledge and guidelines for action (2003 pp. 77–80). The importance of such aspects of each key competency will be a recurring theme of this report.

The prefix "meta" means "about" so metacognition can be broadly translated as thinking about cognition—i.e. thinking about one's own thinking. However, an important challenge for the key competencies from the perspective of sociocultural theory is that "cognition" is not just a brain-based mental activity. A non-dualistic view challenges us to consider "embodied" ways of knowing—ways our minds and bodies respond without us necessarily being consciously aware of them. As outlined above, a focus on reflection also challenges teachers and students to become much more conscious of ways culture and artefacts carry their own embodied meanings, and so invisibly shape what we do.

How research and theory inform this paper

Selected key ideas from sociocultural theory are described above and are further discussed in the following sections, as relevant. Since the scope of those sections is wideranging, many other theoretical aspects of education are also implicated in the discussions that follow. This paper does not provide a comprehensive literature review of any of these additional theoretical aspects. This was not possible within the time and resources of the project. Its purpose is to act more as an ongoing professional conversation about the scope and nature of the key competencies. However

it is important that the way in which theory has informed the discussion should be transparent and able to be critiqued. To this end, each section draws on a small number of nationally and internationally published researchers, most of them widely known and cited. Theoreticians whose ideas informed each section are briefly introduced on the first occasion their ideas are cited, starting with the "thinking" section that now follows.

The structure of the report

The key competencies are introduced in the following order:

Thinking comes first because of its cross-cutting role as an aspect of all competencies (see above). It is also likely to be more familiar, and more often already explicitly addressed in learning programmes (at least in some aspects) than the other four key competencies.

Using language, symbols, and texts is introduced next for the opposite reason—it is likely to be the least familiar, at least in its broadest manifestations. As for thinking, the primary focus is cognitive, although affective and identity dimensions are not excluded.

Managing self then introduces a stronger focus on identity/belonging aspects of the key competencies. However the cognitive components are still important.

Relating to others logically follows. It is like one side of a coin that has managing self on the other face. Again, it has both cognitive and affective dimensions.

Participating and contributing is discussed last because it is seen as the key competency that integrates all the others with each other, and with the contexts of learning.

Each of the five sections begins with the current definition of the relevant competency, as included in the draft curriculum document schedules to be released in June 2006. The discussion that follows outlines links to the essential skills of the current curriculum framework (Ministry of Education, 1993) and briefly explains how the competency extends beyond the scope of "skills" and clarifies any necessary detail related to the definition. This section is longest for using language, symbols, and texts, since some of the ideas associated with this competency are likely to be unfamiliar.

Following the brief introduction to key theorists, each section includes a short discussion of the rationale for seeing the competency as "key" to learning.

A discussion of "opportunities to learn" then highlights issues and challenges for teaching and learning, including the incorporation of metacognitive aspects. This is followed by, or includes, selected examples that describe actual teaching and learning situations in which the relevant competency has been addressed. These are intended to be illustrative of potential rather than encompassing the full scope of the competency.

2. Thinking

An overview of this competency

Thinking is about using creative, critical, metacognitive, and reflective processes to make sense of and question information, experiences, and ideas. These processes can be applied to research, organization, and evaluation for all kinds of purposes—developing understanding, making decisions, shaping actions, or constructing knowledge. The competency implies intellectual curiosity.

Students who have well-developed thinking competencies are active seekers, users and creators of knowledge. They can reflect on their own learning, draw on personal knowledge and intuitions, ask questions, and challenge the basis of assumptions and perceptions. (Taken from the draft curriculum definition, April 2006.)

The term "higher-order thinking" is often used to refer to the three types of thinking listed at the start of this definition, as described in the draft curriculum.

This key competency subsumes outcomes from all of the previous essential skill groupings. It focuses on all types of both critical and creative thinking, and includes innovation and entrepreneurial thinking, all of which were listed as outcomes of the "problem solving" essential skill. Other skills outcomes that link particularly strongly to thinking as a competency include:

- Discrimination and analysis of media messages, and arguing a case logically and convincingly (communication skills);
- Analysis and organisation of numerical information in a range of formats (numeracy skills);
- Analysis, synthesis, evaluation, and interpretation of information (information skills);
- Developing self-appraisal skills (self-management and competitive skills); and
- Responding critically to discriminatory behaviours (social and co-operative skills).

That examples could be so easily listed from across the range of essential skills illustrates the *holistic* nature of key competencies. As noted in Section 1, naming this as a discrete competency alongside the other four key competencies has been somewhat controversial. All the key competencies have strong cognitive and metacognitive (thinking) components. In this report it is discussed first, so that any cross-cutting themes can be easily identified in the other four key competencies that follow.

A note about the theoretical sources

Leading researchers and research projects used to inform this section include:

- David Perkins from Harvard University, often cited as a pre-eminent expert on ways of developing students' thinking;
- Guy Claxton, a British educational psychologist, well known internationally for his ideas about fostering thinking and learning more generally;
- a team at Kings College, London led by Jonathon Osborne, which has been working with teachers for a number of years to develop a range of tools for teaching argumentation;
- Jane Gilbert, a chief researcher at NZCER, whose recent book *Catching the Knowledge Wave* translates a wide range of future-focused ideas into the New Zealand context; and
- Anat Zohar and Noa Schwartzer, Israeli researchers of the challenges of teaching for thinking, who draw on interesting experimentation with pedagogy in some Israeli schools.

Why focus on thinking?

What long-term outcomes might we aspire to by placing thinking at the heart of our revised curriculum? David Perkins suggests:

> We would like youngsters, and indeed adults, to become alert and thoughtful when they hear an unlikely rumour, face a tricky problem of planning their time, have a dispute with a friend, or encounter a politician's sweeping statement on television (Perkins, 2003, p.1).

However, Perkins cautions that building thinking skills, while necessary, is not a sufficient underpinning for achieving such aspirations. His team's research has found that the *disposition* to use higher-order thinking is what is more likely to be lacking when people fail to do the sorts of things he suggests in this quote. It is not that people cannot think, but they are "simply oblivious to situations that invite thinking" (p. 1).

This focus on dispositions illustrates an important difference between thinking as a set of skills and thinking as a competency. Paul (2000) organises thinking dispositions into five broad groups:

- curiosity, inquiry, playing with ideas, questioning;
- thinking broadly, making connections, being open-minded and fair;
- being careful and clear when reasoning;
- being organised and planning ahead; and
- willingness to take time to think.

Users of Art Costa's popular "Habits of Mind" educational resources will recognise similarities between this list and the 16 habits identified there.[1]

In her book *Catching the Knowledge Wave*, Jane Gilbert says learning to think in new and different ways is more important than ever as New Zealanders learn to take part in an increasingly

[1] See www.habits-of-mind.net/-

global society. Rather than being seen as a threat, the diversity that comes with more mixed and mobile communities provides important opportunities for creative thinking (Gilbert, 2005).

It can be easy to assume that providing situations where students *could* think means they *will* think. As the following discussion shows, this is not the case. The advantage of making "thinking" a separate key competency is that it becomes an explicit focus of learning.

Opportunities to learn

This section briefly outlines several interesting debates about the development of higher-order thinking in educational programmes. The questions have been chosen because they contribute insights into the nature of the key competency, while also providing opportunities for reflection and debate about students' opportunities to learn thinking competencies.

General or specific thinking programmes?

Should thinking be integrated into specific curriculum areas or can it be taught in separate programmes? This is a contested issue and the answer partly depends on whether thinking is seen as a matter of developing general or content-specific competencies and dispositions. Recent research suggests it is wise to take a "both/and" approach to this question rather than seeing these as either/or alternatives. For example, Perkins sees some value in learning specific strategies but says these must be easy to use, and for the teacher to model in the normal flow of classroom discussion (Perkins, 2003). Such conditions will help students adopt and internalise the thinking processes, which they will need to do if they are going to develop the disposition to use them in other contexts.

Perkins also says that "general skills of thinking are no substitute for knowledge in particular subject matters" (Perkins, 1991, p.4). Perkins' short book chapter, which is available on the internet[2], provides explicit examples of what he calls "subject specific mindware". Key ideas are summarised in the table below. The table illustrates how the knowledge codes (mindware) of one or more discipline areas are involved in identifying and solving problems, while other aspects of knowledge codes are involved in evaluating evidence and determining what is "true".

[2] www.newhorizons.org/strategies/thinking/perkins.htm

Table 4 **Thinking competencies in different subject areas**

Subject area	Competency
Subject-specific problem-solving "mindware"	
Physics	Algorithms and equations
Literature	Fundamental dimensions of stories (plot, character, setting, etc.)
Creative writing	"Free writing" strategies
Subject-specific explanation and justification "mindware"	
Mathematics	Formal deductive proof
Sciences	Empirical evidence
History	Evidence from primary sources

It is important that a focus on subject-specific contributions to higher-order thinking is not taken to mean that thinking will develop automatically while the focus is on content. There is a tension between covering content and fostering thinking because the latter requires a lot of time. Teachers who try to do both at once often end up telling students *about* thinking, which amounts to doing their thinking for them! There is an equivalent danger in the generalist approach, if teachers use strategies like recipes, directing students to think in formulaic ways. This, too, amounts to doing their thinking for them, depriving students of the practice they need, and the opportunities to make and learn from their own mistakes. Because practising thinking takes time, content reduction may be required (Zohar and Schwartzer, 2005).

Many contested issues and situations are value-laden and cannot be settled by recourse to the formal knowledge (what Perkins calls "mindware") from any one discipline area. In that case students must learn to identify the types of intellectual tools needed to address different aspects of the situation. They must also learn to identify possible values positions, and to clarify why they hold the values they do, as they construct their arguments. In turn, that may lead to a need to learn about reasoning ethically, where rights and responsibilities of different groups are in conflict. Robert Sternberg, a widely respected psychology professor, puts it this way:

> In our most recent work, we have attempted to go beyond conventional notions of expertise to teach children not only to think well, but also wisely…. This work is motivated by the fact that many of today's current leaders are very intelligent and well educated, but foolish at the same time…. When schools teach for wisdom, they teach students that it is important not just what you know, but how you use what you know—whether you use it for good ends or bad (Sternberg, 2003, p.7).

Caught or taught?

Zohar and Schwartzer (2005) review previous research on teaching to develop higher-order thinking. They say that thinking competencies will only develop when they are specifically taught. Opportunities to learn are provided when:

- students have many opportunities to actively practice thinking as they complete cognitively challenging tasks;
- they are introduced to a variety of thinking patterns and skills;
- they have opportunities to transfer what they learn about thinking in one context into different contexts;
- teachers use and share a vocabulary of thinking words, to give students the language tools they need to think about their thinking;
- students receive specific feedback on their progress in learning to use these thinking tools and approaches;
- teachers encourage students to think in a free way, and help them to learn from any mistakes they may make in the process;
- students practice and get feedback about their developing meta-level thinking (thinking about thinking); and
- teachers adopt the role of initiator and coach rather than being the teller of information (Zohar and Schwartzer, 2005).

To be able to do these things, teachers obviously need to know how to use and talk about a range of thinking approaches and strategies, and they also need to know how to recognise and help students when they encounter learning difficulties in using these strategies. Perkins' work reminds us that teachers need to use thinking talk naturally and fluently if students are to adopt and then internalise it, so that their dispositions as thinkers develop and flourish. It can be easy to take thinking vocabulary for granted and so the next table provides an illustrative sample for comparison with current practice.

Table 5 **Words for a thinking vocabulary: an illustrative sample**

Nouns	Verbs	Adjectives	Linking words
Belief	Think	Wider	So/Consequently
Evidence	Test	Different	But/However
Reason	Connect	Explicit	Because
Idea	Rate	Observed	Instead
Claim	Create	Defined	Also
Theory	Compare	Deliberate	Therefore
Deduction	Generalise	Thoughtful	Conversely
Analysis	Speculate	Speculative	According to
Conjecture	Justify	Weighted	
Hypothesis	Challenge	Recognised	
Supposition	Verify	Convincing	
Principle	Refute		

In New Zealand schools many tools that develop aspects of these thinking competencies are already popular. They include (in no particular order):

- "Six thinking hats": a tool devised by Edward de Bono for opening up creative thinking by identifying different perspectives on an issue or question;
- "The three story intellect": a metaphor that supports higher-order critical thinking, based on Bloom's taxonomy;
- "Habits of mind": a checklist, developed by Art Costa, that supports the use of multiple thinking strategies, and strengthens dispositions to use them; and
- "Learning styles": based on the ideas of Howard Gardiner, a metaphor for making more metacognitively aware choices of various learning tools and techniques.

Only for "bright" students?

One theme that Zohar and Schwartzer identified in previous research is a tendency for teachers to see a specific focus on higher-order thinking as something that is not appropriate for "low ability" students. They refute this, saying that it is important for all students to have opportunities to develop their higher-order thinking abilities if they are to function successfully in our complex world. Thus, they see this as a social justice issue.

Perkins also asserts that "intelligence is, to a substantial degree, learnable" (Perkins, 1991, p.1). Some aspects of intelligence are determined genetically (a *neural* view of intelligence), and others come with increasingly wide experience and expertise (an *experiential* view of intelligence). However, some aspects of intelligent behaviour do come from knowing how to think and having the dispositions to do so (a *reflective* view of intelligence). Of the three aspects, Perkins says it is the reflective aspect that is the most amenable to learning, and so presents the best target for educational programmes.

Educational psychologists strongly endorse this view. Guy Claxton compares working out at a gym to build a strong body with doing challenging mental work to build learning power. Just as it is possible to increase body fitness through exercise, so it is possible to get mind fit through practice (Claxton, 2003). Like the other researchers cited above, he says students must be given many opportunities to practise. Jane Gilbert expands on the metaphor of "learning fitness" to suggest ways to think about the roles that teachers play. These ideas are summarised in the next table.

Table 6 **Teaching for thinking fitness**

Gym instructor's role	Equivalent teaching role
Designing a body fitness programme suitable for an individual's starting level	Designing a mind fitness programme suitable for an individual's starting level
Coaching on correct use of specific fitness equipment	Teaching about use of specific types of thinking tools
Setting individual targets that are challenging and extending but don't risk physical injury	Setting individual learning goals that are challenging without being too discouraging
Supporting and encouraging regular practice	Supporting and encouraging regular practice
Coaching individuals to design and take responsibility for their own fitness programmes	Coaching individuals to design and take responsibility for their own fitness programmes
Working on their own fitness, being a role model	Modelling pleasure in their own thinking and learning

* These ideas are a summary of Gilbert (2005, pp. 86–88).

Gilbert points out that a coach can support and enable fitness training, but they cannot become fit for someone else. Ultimately that is each student's responsibility. In this way, thinking as a key competency and "managing self" as a key competency are closely linked.

Is metacognition really necessary?

Research suggests that simply practising thinking practice without reflecting on the process is not sufficient to help students become mind-fit thinkers. Again, the research programme of Perkins' team is informative. They identify three different but inter-related active processes in developing thinking competencies (Perkins, 1991). All of them require reflection on the changes that are being made:

- Patterning occurs when students learn to organise their thinking in flexible ways.
- Repatterning occurs when students consciously replace existing patterns and strategies with more powerful ways of thinking.
- Depatterning occurs when students learn to recognise and change overly narrow and unhelpful thinking patterns.

An example: coaching to develop argumentation

This example is based on the most recent report of an ongoing research project in the UK. Simon, Erduran, and Osborne (2006) from Kings College London, have developed and trialled materials for teaching the many aspects of thinking involved in argumentation:

> Argument refers to the substance of claims, data, warrants, and backings that contribute to the content of an argument; whereas argumentation refers to the process of assembling the components (in other words, of arguing) (Simon *et al.*, 2006, p.237).

In the most recent stage, the researchers worked closely with 12 teachers of UK Year 8 students (aged 12–13 years) from multi-ethnic schools in the greater London area. They videotaped

lessons, talked with the teachers, and analysed the tapes to determine all the types of teacher actions that could help students actively build their skills of argumentation. The results of that analysis are summarised in Table 7. The grey shaded boxes at the bottom of the table represent higher-order or "meta" level processes. They cannot be used until the lower-order aspects such as listening, constructing arguments, and justifying have been established.

Commentators on this research have noted that Simon's team counted the argumentation strategies but did not comment on the quality of the arguments made (Yore and Treagust, 2006). This is a timely reminder that an argument needs to be substantive! The challenge is to keep clear *knowledge* outcomes in mind, and to construct the position adopted with integrity (a values component) while still providing rich opportunities for practising *thinking*.

A related challenge is that evidence and arguments concerning real-world issues are likely to draw on more than one curriculum area. This raises questions of curriculum integration. Because this issue arises for most of the key competencies, it is discussed in the section on the final competency—participating and contributing.

Table 7 **Teaching to develop thinking competencies in argumentation**

Argument process	What the teacher does
Talking and listening	Encourages discussion
	Encourages listening
Knowing the meaning of argument	Defines argument
	Models examples of argument
Positioning	Encourages a diversity of ideas
	Encourages students to take a position
Justifying with evidence	Checks evidence
	Gives examples of evidence
	Prompts students to use evidence to justify claims
	Emphasises the importance of justification
	Encourages further justification
	Plays the devil's advocate
Constructing arguments	Uses writing frame or other structured written work
	Facilitates student presentations
	Creates role plays and assigns roles
Evaluating arguments	Encourages evaluation
	Evaluates students' arguments with respect to their actual evidence/content, and the nature of that evidence
Counter-arguing/debating	Encourages students to anticipate counter-arguments
	Encourages debate (e.g. through role play)
Reflecting on the argument process	Encourages reflection
	Asks about instances where students have changed their minds

Acknowledgement: This table is based on the research of Simon, Erduran, and Osborne (2006).

Integrating the key competencies in argumentation

While **critical thinking** is the main focus in argumentation, some aspects of **creative thinking** are also needed—for example being able to imagine what an issue or situation might seem like from a number of different perspectives, and connecting ideas or metaphors from a range of learning areas.

The activities described on the table obviously require students to demonstrate competencies in **relating to others**, such as active listening, and working co-operatively and collaboratively.

Students cannot do these things without **participating and contributing** in some way.

When students learn to reflect on the argument they have constructed, they are demonstrating an important aspect of **managing self**.

Working with evidence from different knowledge areas will extend students' understanding of the codes with which that knowledge is expressed, and the construction of both verbal and written

arguments can enhance their expertise with **languages, symbols, and texts**. This is the key competency introduced next.

3. Using language, symbols, and texts

An overview of this competency

Using language, symbols, and texts is about working with the codes in which knowledge is expressed. Languages and symbols are systems for representing and communicating information, experiences, and ideas. People use languages and symbols to produce texts of all kinds: written, spoken, and visual; informative and imaginative; informal and formal; mathematical, scientific, and technological.

Students who are competent users of languages and symbols can interpret and use words, number, images, movement, metaphor, and technologies in a range of contexts. They also recognise how choices of language and symbol affect people's understanding and they ways in which they respond to communications. (Taken from the draft curriculum definition, April 2006.)

Of all the competencies, this is perhaps the one that is potentially most different from the previous essential skills. It subsumes aspects of "communication skills" and "numeracy skills". It includes, but is far more than, simple literacy and ICT skill development. This competency is about understanding and knowing how our perceptions of the world are constructed through language, and how we use language in different ways to do different things. It is important that it is not thought of as just the "literacy and numeracy" competency. Examples of wider and more traditional links to the previous essential skills include:

- Convey and receive information, instruction, ideas, and feelings appropriately and effectively in a range of different cultural, language, and social contexts (communication skills);
- Recognise and use numerical patterns and relationships (numeracy skills);
- Use a range of information-retrieval and information-processing technologies confidently and competently (information skills);
- Adapt to new ideas, technologies, and situations (self-management and competitive skills);
- Participate appropriately in a range of cultural and social settings (social and co-operative skills); and
- Develop specialised skills related to sporting, recreational, and cultural activities (physical skills).

When the key competencies were defined in an early draft of the revised curriculum, "using language, symbols, and texts" was called "making meaning". Feedback showed that this was sometimes interpreted as "understanding" ideas in general—that is, students make meaning when they come to "know" an idea in the specific (usually one) way intended by the teacher. As the

following discussion will show, this is *not* the direct focus intended for this key competency, and this interpretation is much narrower than what is intended. An overview of the learning challenges involved in developing this key competency should, however, show that deeper understanding of "content" is likely to result when there is an explicit focus on the tools of meaning making. Thus the narrower agenda of "content acquisition" is not lost, but is subsumed within a much broader and future-focused view of possible curriculum outcomes.

A note about theoretical sources

Leading researchers and research projects used to inform this section include:

- James-Paul Gee, an internationally renowned American researcher of learning to read, and of the impact of ICTs on learning for literacy;
- Gunther Kress, from the London Institute of Education, well known for his work on making meaning in multi-modal environments, including research of what teachers actually do in their classrooms;
- Jay Lemke, an American socio-linguist who works in similar areas to Gunther Kress;
- a research project in which invited international experts analysed videotaped sequences of Australian senior secondary students at school, to establish the actual literacy challenges they faced on a daily basis (in this section it is called the ACER project for brevity); and
- Larry Yore, a well-known American science educator who discusses relationships between the nature of knowledge and the concept of "scientific literacy". He briefly appeared in Section 1 and both papers cited here are international collaborations.

What does this competency encompass?

Because the focus of this key competency is different from what might commonly be understood by language, it may need a bit more "unpacking". First, the scope of the terms used in the title, and the reasons that these were chosen, need to be outlined.

Language

Language is a tool for meaning making. As it is used here, this term encompasses all the organised systems we have for communicating and exploring ideas. It is far broader than just systems of words and grammar. In dance and drama specific ways of moving become languages —we could speak of the language of mime, drama, or classical ballet, for example. Mathematics uses languages of numbers to convey ideas. (Note that the plural is used—it is typical of complex cultural tools that the components of any meaning-making system can often be put together in quite different ways for quite different purposes.) Languages are not static. They keep evolving as we find new ways of communicating in new situations. (Think of the language of text messaging, for example.)

Even when languages do use words and grammar, there are multiple possible systems. Yore and Treagust (2006) talk about a "three language" challenge that students face when they move between their:

- home language;
- the instructional language of the classroom; and
- the specialist language(s) of discipline areas.

Symbols

Symbols are the components from which languages are constructed. Words are relatively "empty" symbols, which we infuse with meaning as we learn to say, read, and write them as others in the relevant cultural group do (Kress, 2003). Grammatical conventions symbolise relationships between words. As anyone who has learnt a second language knows, this acts as a powerful filter of the meanings it is possible to make in any home language.

Specialist languages often have specific grammar features that symbolise particular ways of thinking. For example:

- Sentences in history often start with a time marker—"One hundred years ago…"—whereas science sentences typically start with the object under scrutiny—"Gold is a metal that…".
- In science, specific adjectives can turn into much broader generalisations that confer a type of property on objects—white as a simple adjective, becomes "whiteness" as a property. There is no equivalent of this grammatical feature in Asian languages (Nisbett, 2003).
- In the English language, nouns and verbs carry a lot of the meaning in a sentence, changing as the tense changes and having both singular and plural forms (e.g. mouse/mice, play/played). By contrast, to cite one simple example, in the Māori language, a lot of the meaning is carried by relationship words other than verbs and nouns. For example te manu (singular) and ngā manu (plural) both refer to birds.

Specific movements can be discrete symbols within a language system. More informally, gestures can symbolise different meanings in different cultures. Marketers work hard to infuse lifestyle messages and consumer desires into visual symbols such as the "golden arches" of McDonalds fast food outlets. ICTs rely extensively on intuitive picture symbols that initiate specific types of actions across a range of applications. And so on.

Students often need help to learn the meaning of any one symbol within the context of a specific language system. For example a = symbol in arithmetic usually means "now work out the answer" while in algebra it might mean "make sure both sides of the equation balance" (Darr, 2003). Even something as obvious as a number such as "twenty", written as 20, encodes several separate symbols and symbol systems. Zero is a powerful mathematical symbol for "nothing", but it was invented much later than the numeral symbols for specific amounts. Twenty, written as 20,

symbolises 2 lots of ten (20 = 2 x 10), a way of numbering that is part of the meaning-making system we call decimal numbering.

Texts

Texts are the product of all this meaning-making activity. Kress describes them as tapestries we weave from the languages available to us (Kress, 2003). We are accustomed to thinking of text as written words on a page but even here, multiple methods of text presentation are possible. Texts for newspaper articles have different features to texts in reference books, or recipe books, or texts of poems. Texts can be oral, for example a conversation between two people at the shop, or a speech or soliloquy. Texts can be visual. Works of art, cartoons, advertisements, films, videos, music scores, and photographs are all predominantly visual texts. Texts can be kinaesthetic. A dance is a text whose languages can be read.

Different languages are often melded together in one text. The text of a play, for example, may include directions for movement and physical staging, while textbooks may draw on visual diagrams, sketches, graphs, tables, and more than one type of written text (e.g. formal exposition and student examples). Increasingly, texts are becoming multi-modal, combining sound, moving images, 3-dimensional objects, colour, and so on with the more traditional modes of spoken, written, and visual languages.

The move to more multi-modal texts has been made possible by the rapid rise of ICT. More complex and colourful texts that are expensive to mass-produce by printing on paper are much cheaper to produce on an electronic screen. Also, because many different languages, including movement and music, can be converted electronically to digital data, combining multiple modes of communication is possible on screen in a way that paper could never allow (Kress, 2003).

A note about semiotics

Semiotics is an academic term that is useful to describe what is intended by this competency. It refers to an explicit research focus on all the ways that meaning can be, and is, made. It is a wider term than linguistics, which is the study of making meaning from words and language, because it encompasses the much wider sense of multiple languages and symbols outlined above (Kress, 2001). The following table gives a comparative summary of the semiotic features (languages and symbols) of basketball and biology, as discussed by Gee (2003).

Table 8 **Examples of meaning-making features of two "semiotic domains"**

Features of biology	Features of basketball
Specific vocabulary for describing, and ways of investigating, biological phenomena More precise use of descriptive language than in everyday talk (e.g. specific measures rather than phrases such as "a lot") Action verbs often turned into abstract nouns (e.g. grow becomes growth) Emotional and colloquial language not used Diagrams	Court markings as signs that control the action Point scoring rules (related to court markings) Specialist language for specialist sequences of movements (e.g. "dribble" the ball) Gestures for conveying intentions between players, for example when setting up structured moves (which will also have their own language)

Gee makes the important point that knowing *about* a domain of meaning is not the same as knowing it as an insider. He argues that the richest meanings are made when we have direct experience of the domain on which to draw. For example, descriptions and images of basketball will be "read" much more meaningfully by students with direct experience of playing this sport. Gee explicitly links this argument to theories of learning as *situated cognition*. From these perspectives our active experiences are stored in our heads, like videotapes, that we can play, re-play, and re-sort as we learn. Another way of describing this is to say our experiences—both our actions and our talk and thoughts about our actions—are "embodied". The theme of "authenticity" in learning will be revisited in the section on the key competency "participating and contributing".

Why focus on languages, symbols, and texts?

The knowledge age has seen a shift from the dominance of verbal print-based texts where language carries most of the meaning and other features illustrate the text, to screen-based texts where images carry most of the meaning and features such as written text act as supports. Differences between these two ways of making meaning are summarised in the next table.

Table 9 **Key features of verbal and visual media**

Verbal	Visual
Print/word-based/linked to sound	Screen/image based/linked to vision
Words follow in a temporal sequence (you read one after the other)	Images appear simultaneously (you read the arrangement in the space)
Sequencing implies cause/effect logic	Open to different sequences of reading
Words must be "filled with meaning"	Images already relatively full of meaning
Writing conveys the message, images "illustrate"	Writing is one (usually minor) part of message

This represents a very significant shift for the types of meanings that can be made and it is important that today's children learn about this shift (Gilbert, 2005; Kress, 2003). They usually have many direct experiences of screen-based communication in their lives outside school and these types of experiences need to be drawn into their education rather than being seen as unwelcome distractions from real learning (Gee, 2003). For Gilbert, this means rethinking the ways we use ICT in learning programmes:

> If constructing meaning is now multi-modal, it makes sense to use ICTs to develop young people's literacy in these different modes. Literacy education programmes could then draw young people's knowledge of these technologies into their education, not set it apart from them (Gilbert, 2005, p. 126).

Gilbert points out that ICT still tend to be used in traditional ways, to support students' acquisition of *information*, rather than being used to explore how knowledge-building and meaning-making activities have changed in a screen-based, electronically networked world. In the "knowledge era" there has been a shift in emphasis from learning as storing up existing knowledge, to learning as a means of actively building new knowledge (Gilbert, 2005). Students need to learn to do this if they are to become the "knowledge workers" our economy now needs, whilst also providing a good standard of living for themselves. For this reason it is important that students learn in ways that build understandings of the "rules of the game" of knowledge construction in each main discipline area. Ways of communicating ideas in science—for example using graphs, tables, words for properties and so on—are designed to convey ideas as objectively and precisely as possible, because objectivity and precision are valued in scientific methods of knowledge construction. This type of understanding is a "meta"-level understanding—i.e. knowing *about* science rather than knowing the science, and so involves metacognitive discussion of meaning making.

How all this relates to "basic" literacy

Few would dispute that learning to "read and write" underpins many other aspects of learning. However Gee says that the mere learning to decode the symbols of a text should not be taken as "reading". To truly read material from any semiotic domain is to read it as an insider would—that is, you would know the "rules of the game". When you can do that, you can be said to be "literate" in that domain. Similarly, to be a literate writer is to produce the language of the domain (or "discourse") as an insider would. For example, when they work towards science literacy, students are supported to read and write science texts using the conventions of the domain that scientists would also use (Yore, Hand, and Florence, 2004).

For Gee, access to a rich range of experiences is an important principle for ensuring all students have equal opportunities to learn to become literate in this deep sense (not just to decode words on a page). There is an obvious link here between "using languages, symbols, and texts" and the key competency "participating and contributing". However experience, per se, is not sufficient. Students also need help and support to explicitly recognise, name, and learn about the special meaning-making features of each type of social practice in which they take part. Because these

are social practices, they need to do this with others.[3] Here is a link to another key competency: "relating to others". From the perspective of situated cognition, Gee identifies four levels of active participation needed for acquiring literacy in any given domain. These are summarised in the next table.

Table 10 **What does it take to acquire meaningful levels of literacy?**

Aspect of learning	How this contributes to literacy
Experiencing the world in new ways	Language development comes when we gain new perspectives on our experiences and learn to describe these to ourself and others. This may be through direct activity, or through books, films, and other such resources that open up new worlds and ideas to us.
Participating in the relevant social group	Interactive dialogue with teachers, more advanced peers, and other adults helps students hear and practise the words and grammar with which new ideas are talked about. This dialogue may be spoken in the first instance, but producing other forms of texts (e.g. written texts) is also important.
Gaining resources to prepare for future learning and problem solving	Literacies are tools for our future and ongoing learning. Resources here extend well beyond conventional language as outlined above.
Learning critical perspectives towards the domain ("meta"-level thinking)	When we know and can discuss a semiotic domain as a complex system of inter-related parts, we are able to produce new and novel meanings by experimenting with ideas and actions in the domain.

Opportunities for learning

Reflecting on the potential for multi-modal communication is a useful way to scope the importance of knowing how and when to make the use of different types of languages, symbols, and texts more explicit. The ACER research showed that even students in the senior secondary school have problems when they are required to rapidly switch between visual and text-based languages. They must somehow make meaning from the integration of very different sorts of information (for example from equations to graphs to diagrams to data loggers to notes on the board in the sciences). They need help and support to use these meaning-making tools much more deliberately. The pace with which the teacher switches back and forth between them may inadvertently leave some students behind (see for example Lemke, 2001).

General or specific literacy programmes?

Every subject has its own languages, symbols, and texts, so all curriculum areas should be seen as providing rich contexts for developing children's understandings of similarities and differences between these. That is, there are subject-specific components to more generic literacy skills, even at the primary school level.

[3] "Others" in this context includes teachers, authors of any texts children may read, peers, family members, and people in the wider community, and so on.

The ACER analysis highlighted the complex literacy demands of different secondary school subject areas. This suggests that a generic focus will not be sufficient, and that each subject should incorporate discipline-specific literacy learning. In the light of this, it is encouraging that 92 percent of all the secondary schools that took part in the 2003 National Survey had introduced a literacy programme as a recent innovation (Hipkins and Hodgen, 2004). However, several ACER commentators also gave critical caveats to the literacy-across-the-curriculum recommendation. In his contribution to the ACER project, Kress sounds a note of caution about the concept of "multiple literacies":

> …the use of the term at once also provides a comforting answer: we are all "doing" literacy. This answer then acts as a full stop to further essential thinking and analysis. Once the ointment of literacy has been spread evenly across the problem areas, we have all done our bit and that might then be that (Kress, 2001, p.23).

One group of researchers on the ACER project[4] found that they needed to share their experiences in order to understand how literacy challenges varied across subjects:

> In our study group discussions, we agreed that thinking about multiple sign systems has changed us as teachers. We no longer assume that our students learn only through language; we are more conscious of their use of multiple sign systems. We also attempt to develop their skills (and our own) in using sign systems other than language. In order to do this, we have to converse with teachers in other disciplines, talking about what students have learnt in art or drama class that might help them explore a new concept, and finding out how they are handling conceptual development through multiple systems in science or math (Indiana Study Group, 2001, p.189).

They note that some discipline areas are better than others for different types of meaning-making challenges:

> …art expresses feelings and social commentary better than mathematics does. Mathematics expresses relationships and patterns better than drama does. Drama expresses human interactions and story better than photography does. And so on (Indiana Study Group, 2001, p.188).

You may not agree with the opinions about the relative merits of different disciplines given as examples here. Indeed they could make a good focus for debate! The point is that we do choose different cultural meaning-making tools to suit different purposes, and that students need to learn to justify their choice of tools. This requires the development of a shared language for classroom talk about meaning making in different subjects.

Caught or taught?

Gee points out that one of the challenges for subject specialists is that it is easy to take the specific languages and modes of communication of the discipline for granted when the teacher is skilled in their use (Gee, 2003). The ACER research reported that literacies are usually taken for granted in

[4] The "Indiana Study Group" made up of six teachers from several tertiary institutions in Indiana.

the senior secondary school. Very few teachers in the classrooms they observed actively taught students about the languages, symbols, and texts of their discipline (Lemke, 2001; Wyatt-Smith and Cumming, 2003). Yet knowing how a particular discipline "works" may actually increase students' chances of understanding the main ideas or content. Yore and Treagust (2006) see a "symbiosis" between learning the specialist modes of communication in the sciences and gaining a deeper understanding of science concepts. The question is one of priorities and explicit attention. They caution that specific literacies will not automatically follow from "content" learning (Yore and Treagust, 2006). Thus the message is essentially the same as for developing "thinking" as a key competency—integrate into subjects but keep a specific focus and create many opportunities for active practice.

Illustrating one way explicit teaching might take place, a Year 9 mathematics teacher made use of several ICT as he helped his students to learn about ways graphs can be created as symbolic representations of real-world events. The equipment included a motion sensor, linked to an algebraic calculator, which in turn was linked to a data display. The calculator was programmed to convert body movements to distance/time graphs. To begin, students experimented with different ways of moving in the field of the sensor. They watched the shape of the graph change and looked for patterns in this visual data display. After a time another activity was introduced. The calculator was set to generate random distance/time graph shapes. The challenge for the student in front of the sensor was to move in such a way that the line he or she generated matched the graph already on the screen as closely as possible. In this way, students directly experienced the conversion of real movement to a graphical representation of that movement.

Literacy for all?

For Gee, providing equal opportunities to all students to become truly literate is an important issue of social justice. He points out that some students come to school already experienced in using the languages of school, while other students need much more support to see how to move between home and school languages as they build their literacy competencies (Gee, 2003).

In the New Zealand context, the high proportion of students who were not born here, for many of whom English is not the home language, makes this especially compelling. The first PISA international tests, conducted in 2000, found that 10 percent of the participating New Zealand 15-year-olds had a language other than English as their home language. New Zealand had the fifth highest proportion of these students of the 32 nations taking part (Ministry of Education, 2001). Students who spoke a different home language did not perform as well in the reading literacy tests as students for whom English was the language of communication at home. In the 2003 PISA round, when mathematics literacy was the main focus, a similar pattern was found. In this survey 9 percent of New Zealand students had a home language other than English and again they did not fare as well as their English-speaking peers (Ministry of Education, 2004). Encouragingly, the most recent TIMSS survey (undertaken in 2002–2003) shows a change. In both mathematics and science the achievement gap between students who did not speak English at home and those who did narrowed considerably (Ministry of Education, 2006). This

underscores the point made by Claxton and Gilbert—all students can improve their learning "fitness" with help from their teachers. An understanding of the meaning-making roles of various modes of communication (singly and in combination) is an important component of the "fitness equipment" (Gilbert, 2005) that teachers help students learn to use and practise (see Table 6 in the "thinking" section).

The ACER researchers noticed that the teachers they observed tended to shield students in "vocational" courses from the demands of tasks that required (and built) competencies in written literacy (Wyatt-Smith and Cumming, 2003). NZCER's Learning Curves research similarly reported that teachers were concerned about the "intellectualisation" of so-called vocational subjects when greater use of written accounts was required for NCEA assessments (Hipkins, Vaughan, Beals, and Ferral, 2004). There are two types of challenges to be made here. Firstly, the ACER researchers described very high literacy demands being made of students involved in "hands-on" projects. Rather than formal written literacy these involved listening, observing, moving, and talking in specific ways relevant to the disciplinary knowledge being drawn on. Furthermore, the researchers noticed that when these other literacies were explicitly developed, and students were given the language to reflect on their learning in these terms, written literacy also improved (Wyatt-Smith and Cumming, 2003).

The second challenge, developed in the Learning Curves research, is to the assumption that students taking "practical" or "vocational" subjects do not need to develop literacy skills to the same extent as "bright" students. That they *cannot* has been critiqued in the "thinking" section. That they *need not* is strongly challenged by commentary about learning for the knowledge era (see, for example, Gilbert, 2005) where knowledge itself has become the currency of economic demand and exchange. Rethinking the academic/vocational binary requires teachers to find ways to make learning both academic and practical for *all* students (Hipkins, 2004). For the ACER project Kress analysed one student's learning activities in four subjects—visual art, English, media studies, and drama. He noted that the resources for developing a knowledge of languages, symbols, and texts were indeed present in each classroom, and could have been made apparent had there been opportunities for comparisons to be made across subjects. But this did not happen and the subjects were offered "in a manner that hides their real strength, which leaves them very nearly unusable for the young people who experience them" (Kress, 2001, p.31). This raises questions about the practicalities of curriculum integration, which are revisited in the section on "participating and contributing".

Is metacognition really necessary?

In order to develop an awareness of how language makes meaning, we need to develop a language for talking about languages. As already noted, the specific features of languages used in different discipline areas need to be made explicit. Only then can students use them in the considered ways that metacognition demands. However they will also need the disposition to do so, which brings us to the next key competency—managing self.

4. Managing self

An overview of this competency

Managing self involves self-motivation, a "can-do" attitude, and the ability to establish personal goals, make plans, and set high standards for oneself. It is about students knowing who they are, where they come from and where they fit in.

Students who can manage themselves are enterprising, resourceful, reliable, and resilient. They act appropriately and are aware of the effects their words and actions may have on others. They have strategies for meeting challenges and know when and how to follow someone else's lead or make their own, well-informed choices. (Taken from the draft curriculum definition, April 2006.)

It is important that this key competency is not seen as being only about organisational matters and self-discipline. On one level, "managing self" is about setting, working towards, and monitoring learning goals with reflective self-awareness, and about being organised and ready to learn. It does encompass most elements of the "self-management and competitive skills" and "work and study skills" from the current curriculum framework. And it is also about managing aspects of personal health such as fitness and relaxation that are described in the "physical skills" essential skills grouping. However it also includes much wider cognitive and metacognitive components. It is also about being aware of your strengths and weaknesses as a person and a learner, and being willing and able to use this self-knowledge to approach living and learning tasks strategically.

In the originating DeSeCo work, this key competency emphasises students' developing *autonomy* as learners—finding out who they are in relation to others, how they learn, how their ideas and skills change over time, and why they think, act, learn, and interact as they do. Seen in this light, "managing self" is one face of a coin that has "participating and contributing" as the reverse face (see also Section 1). The strong link between managing self and relating to others is also important to keep in mind. Students cannot learn self-management in isolation from their interactions with others, and they are unlikely to make good progress without support. Autonomy here does *not* mean "doing it by yourself without help". Indeed, some researchers have found that children left to work alone too often are likely to become more passive and dependent on the teacher—the exact opposite of what this competency intends (Bullock and Muschamp, 2006).

A note about the theoretical sources

Leading researchers and research projects used to inform this section include:

- Psychologist Barry Zimmerman who has been particularly active in promoting educational theory and research on self-regulated learning;
- Carol Dweck, another American psychologist whose research of concepts such as "learned helplessness" has been much quoted by other researchers and developed further as the idea of "learning careers" by British adult education researcher Kathryn Ecclestone;
- a research team led by Jennifer Fredricks, who recently carried out an extensive review of empirical research on student engagement;
- Frank Coffield, a Professor of Education at the Institute of Education, London University. He led a team of researchers who recently spent 16 months analysing research on "learning styles" for the Learning and Skills Research Centre in London; and
- British researchers Kate Bullock and Yolande Muschamp have very recently reported UK research on students' perceptions of learning to learn.

Why focus on self-management?

Perhaps the most compelling reason to value this key competency is that it is highly correlated with learning success in school and in tertiary study. The first PISA study found that students who used self-regulating learning strategies were more likely to perform to higher levels on the reading literacy scale than students who did not. However, this research also found only "moderate" use of such strategies by the students in the New Zealand sample (aged 15 years) (Ministry of Education, 2001).

The increasing attention being given to ideas such as self-regulated learning reflects growing awareness of the importance of the metacognitive aspects of learning. Learning to actively manage your own learning is seen as an essential competency for being both willing and able to carry on learning in the years beyond school—so-called "life-long learning". This, in turn, is seen to be important for living in the "knowledge society" when ongoing rapid change means that the learning of most citizens can never stop if we want our economy to be sufficiently competitive to maintain our current living standards (Gilbert, 2005).

Gilbert also identifies a second type of reason that self-management is so important in the knowledge age. It relates to maintaining a healthy sense of our own identity in a complex, fast changing, electronically networked world. From a shared European cultural heritage many of us have inherited ways of thinking about each individual person as a single, unitary entity but:

> In the new online forms of communication, the standard model of individuality is long gone. People routinely use Internet communities (chat rooms, online games and so on) to play with their identity, to construct and reconstruct themselves in ways that have very little to do with their real-world, real-time bodies (p. 117).

When the social world is changing rapidly our sense of self and of location becomes a critical anchor when considering how best to respond to that change. Yet there is no one "right" way to be that self anymore. This makes managing oneself an important aspect of wellbeing, as well as of learning.

Another "knowledge era" challenge for managing self relates to the extensive movement of people from place to place. Few communities are homogeneous any more. In New Zealand, culturally diverse classrooms reflect our diversity as a society. Interestingly, when TV One commissioned an advertising campaign to try to position the channel as "heartland" New Zealand, they did so by using an award winning montage of images that emphasised "ever *diversifying* New Zealanders moving forward together while enjoying the *unique heritage* of each individual" (Smythe, 2005, emphasis added). The first step to interacting appropriately with others of different cultural backgrounds is knowing yourself and your own culture.

Opportunities to learn to be self-managing

Should "managing self" become an important focus for curriculum planning and actual teaching? As for the two competencies already discussed, issues associated with this question must be addressed because teachers are the people who orchestrate opportunities for students to learn this key competency—at least while they are at school.

Caught or taught?

"Self-regulated learning" (SRL) and "cognitive engagement" (CE) are overlapping areas of research that encompass aspects of the idea of managing self. One of the recent best-evidence syntheses, completed for the Ministry of Education, highlighted the promotion of SRL as one of 10 characteristics of effective *teaching* (Alton-Lee, 2003, p.79), which suggests very strongly that this competency should be taught, not caught.

SRL and CE have three key dimensions in common (Fredricks, Blumenfeld, and Paris, 2004; Zimmerman, 2001). Metacognitive dimensions are used to monitor the effectiveness of personal learning, motivational/emotional dimensions include being aware of and using affective dimensions of learning, and behavioural/participation dimensions include purposefully using specific learning strategies. As the next table shows, some of these aspects are under the student's direct control, but other aspects must be provided to support them.

Table 11 **Aspects of student engagement that impact on learning**

Aspect	Extrinsic engagement factors (classroom, teacher, NCEA)	Intrinsic engagement factors
Behavioural		
Involvement Co-operative participation Autonomous/self regulated participation	Clear, consistent goals and clarity of expectations Authentic and challenging tasks Supportive teachers/class climate Peer acceptance	Need to belong/make an effort Need to demonstrate competence Growing need to exercise autonomy in learning
Emotional		
Interest/enjoyment Attainment value Utility value Cost/benefit beliefs	Teacher support/class climate Authentic and challenging tasks	Seeing the value in learning Linking effort to learning
Cognitive/metacognitive		
Investment in learning (performance vs. mastery goals) Learning strategies (surface vs. deep)	Authentic and challenging tasks (over-controlling environments diminish autonomy)	Use of metacognitive strategies Goal setting Use of study strategies

Clearly students cannot do these things alone. Skilful teaching can foster SRL and CE. However it is equally true, as for "thinking" and for "using languages, symbols, and texts", that the teacher cannot ultimately do these things for the student. Self-management improves with active practice. Zimmerman and Kitsantas (1997) observed and analysed the processes of learning new skills to describe a four-stage learning journey to self-regulation:

- Observation of the teacher—the skill is modelled so the learner gains a mental picture.
- Imitation—the learner tries the activity and receives feedback from the teacher as needed.
- Self-control—the learner no longer has to rely directly on the model or the teacher because they have become proficient in the skill.
- Self-regulation—the learner is able to adapt the skill to use it in new ways in response to new challenges.

Some aspects of the widely used "habits of mind" programme, discussed in the "thinking" section also focus on self-management. Examples include: persisting, managing impulsivity, taking responsible risks, and remaining open to continuous learning.[5]

[5] see http://www.habits-of-mind.net/whatare.htm

What about learning styles?

Teaching students to identify and use particular "learning styles" is one popular method of addressing self-management of learning. A team of UK researchers recently reviewed a wide range of learning styles models and found that the claims made for most of them were over-rated, that the evidence that they "worked" was not convincing, nor the theory underpinning them sound. They found competing, fragmented theoretical ideas with no common language for talking about what learning styles actually are (Coffield, Moseley, Hall, and Ecclestone, 2004). These researchers warned of the dangers of stereotyping and labelling students, and said it was by no means clear how teaching should change to accommodate different "styles". They reported that large-scale analyses of "effect sizes"[6] show that both teaching for metacognition and the use of formative assessment are more likely to make a difference to students' learning. With only so much time and energy to make change in practice, they recommended that teachers focus on one or both of these.

General or specific self-management programmes?

As the above table shows, goal setting is an important aspect of managing oneself as a learner. Realistic, specific learning goals allow students to gather feedback about their learning that they can act on. Learning is experienced as an opportunity to build knowledge, rather than a chance to simply test intelligence or compare levels of performance. Obviously students cannot do all this by themselves. In order to set learning goals in relation to their *school* learning, students need to first have a clear idea of what the teacher sees as important to learn in that context, at that time. While the aim is to have students become more skilled at evaluating their own learning success over time, the teacher is an important source of feedback, and must model this in ways that do help students build knowledge. Since many aspects of these learning challenges are subject-specific, fostering self-management is the responsibility of every teacher with whom students work.

Not for all students?

In their extensive literature review, Jennifer Fredricks and her team identified a gap in current research knowledge about young school-age children's ability to self-regulate their learning. They suggest this gap exists because of the view that metacognitive abilities increase with age and hence self-regulation is developmentally inappropriate for young children. A counter view suggests that even very young children can learn to manage aspects of their learning, and to think metacognitively, if this is modelled for them and they are well supported by the environment and the adults working with them. Several collaborations between New Zealand researchers and primary teachers have found that emergent self-regulation is both possible and practical (see for example Joyce and Hipkins, 2005).

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[6] Some carried out by John Hattie, from Auckland University.

Is metacognition really necessary?

You cannot *manage* yourself without being proactive. When *learning* is what is being managed, thinking about thinking will be an important aspect of this proactive stance. Thus metacognition sits at the very heart of this key competency, as it has for the two already discussed.

Bullock and Muschamp (2006) talked to 24 British students who were about to make the transition from primary to secondary school. They found these students all had an instinctive metacognitive understanding of themselves as learners but that this was not well developed in most cases. The students had experienced very few opportunities to exercise choices in their learning, and the researchers said this needed to happen more often, if students were to actively think about themselves as learners. Thus it is not just what is *taught* that matters. Learning opportunities for self-regulation require students to make some learning decisions for themselves (with the proviso that teacher support is available as needed).

Carol Dweck (1999) found that students who view learning ability as a fixed entity that cannot be changed are more likely to be discouraged when they strike challenges in their learning than those who think they can surmount challenges with more effort. If you think you can't learn because you are "not bright" it is very easy for that to become a self-fulfilling belief. Ecclestone and Pryor (2003) built on Dweck's work to develop the metaphor of a "career" to describe how a sense of oneself as a learner changes over time. They said that as students move through school (and in later tertiary studies) they build an "assessment career" within their overall "learning career". Students who are worried about failure may develop an assessment career that minimises the risk of this happening—sometimes by opting out of learning altogether. To illustrate, the Learning Curves research showed how views of self as a learner impact on decisions students make about NCEA assessments:

> While some students do see themselves as successful learners, it seems that many are more likely to see themselves as successful collectors of credits. Accordingly, they are developing assessment careers that use compliance and risk-management strategies to maximise credit gains with little critical regard to the value of actual learning gains. This is of concern because such learner identities and assessment careers are no more conducive to lifelong learning than were previous methods of assessment for qualifications (Hipkins, Vaughan, with Beals, Ferral, and Gardiner, 2005, p.3).

Students caught up in unhelpful views of their own learning potential need what Perkins calls "depatterning" (see Section 2). That is, they must learn to recognise and change aspects of their learning and assessment careers. While an assessment system that reports actual achievement rather than broad age-related grades can help (at any level, not just for NCEA), the intellectual work of recognising and changing their own thinking patterns must be done by the student. This is metacognitive work.

Guy Claxton (2000) discusses the importance of helping students recognise and actively manage the *emotions* that are engendered during their learning. Learning should challenge and extend *all* students and the myth that it is harder for students who are "not bright" is unhelpful in two ways. The first is that repeated experience of negative emotions can lead to the building of a learning career characterised by avoidance of risk and minimal compliance. Claxton notes that students may use any of:

- not trying;
- ignoring the problem;
- attempting to suppress the physical responses associated with the negative feelings (which in turn leads to increased stress); and
- adopting a position of ironic detachment.

All are clearly counterproductive to learning. The second unhelpful aspect concerns students who are accustomed to learning easily. When they first encounter obstacles they may not have strategies to persist and overcome these, instead attributing the need for increased effort to some failure in their overall ability. Claxton uses these examples to encourage teachers to build students' *resilience* by:

- allowing them to make mistakes and supporting them through these (rather than excusing them away);
- encouraging students to accept that is it okay to feel confused while searching for a better understanding;
- supporting students to take risks by acting out of character; and
- helping them recognise and manage the feelings of learning.

Recent evidence, summarised in the latest NERF Bulletin (National Educational Research Forum, 2006), suggests that students who have behavioural problems may be productively supported when the teacher focuses on improving their *academic* skills at the same time as the student works on self-monitoring of their behaviour. An analysis of 22 studies found large increases in academic attainment when students were given responsibility for observing and recording target behaviours. Metacognition is an evident aspect of these interventions.

While students need support to manage negative emotions, Claxton also addressed the aim of developing a lifelong disposition to learn by providing opportunities for students to experience the absorption that comes with deeply engaging learning. Liston (2004) calls this the "lure" of learning and compares the powerful emotions generated to being "in love". Others have also noted the potential for better student engagement that comes with "the idea that intellectual pursuits can be enthralling and that there is joy simply in learning something new" (Schallert, Reed, and Turner, 2004, p.1725). While such experiences may be solitary or shared, learning often takes place in social contexts, both within and beyond school. And so we turn next to the key competency of relating to others.

5. Relating to others

An overview of this competency

Relating to others is about interacting effectively with a diverse range of people in a variety of contexts. The competency includes the ability to listen actively, recognise different points of view, negotiate, and share ideas.

Students who relate well to others are more likely to be open to new learning, and to take different roles in different situations. They know when it is appropriate to compete and when it is appropriate to co-operate. (Taken from the draft curriculum definition, April 2006.)

This competency has some obvious similarities to the "social and co-operative skills" of the current curriculum framework, but there is an important shift in emphasis. This key competency is not only about social skills, as some people have suggested. For example, students learn more about their own and other's ideas when they listen, compare, clarify, and share their thinking—provided, of course, that they are willing to do so and are open to what may unfold as a result.

From the point of view of sociocultural and situated learning theories, interacting with others plays a really important role in cognitive development, because ideas and skills are always embedded in actual contexts that usually involve people and their activities as well as "things". So, for example, the competency also has links to "make connections and establish relationships" from the "problem solving" essential skills grouping.

One less familiar way of thinking about interactions within a sociocultural framework is to see every action that uses a cultural tool provides potential for interaction with the makers and previous users of that tool. So for example, reading a book in ways that engage more deeply with the author's "message" can be seen as having a conversation with the author, at least in the imagination. Gordon Wells succinctly captures both this and the conventional sense of interaction when he describes a problem-solving episode involving a group of students aged 8–9 years who were trying to make a simple water clock work:

> To increase their understanding and solve the problem, they engaged in dialogue together and, in the case of the water clock, with the absent others who had created the books that they consulted (Wells, 2002, p.199).

A note about the theoretical sources

Leading researchers and research projects used to inform this section include:

- Gordon Wells is a much-cited educator who brings a sociocultural perspective to language learning. He is based at the University of California.
- Caroline Gipps has a background as a psychologist and primary school teacher. She is the first female to be appointed Vice Chancellor at the University of Wolverhampton. She has written extensively on assessment issues from a sociocultural perspective.
- Etienne Wenger is an independent research consultant with a background in teaching. With Jean Lave from the University of California he developed the theory of situated learning as "legitimate peripheral participation" that is now central to sociocultural research in education.
- Russell Bishop and Ted Glynn are from the University of Waikato. Their research on Māori in mainstream classrooms has been widely discussed and used as the basis of professional development initiatives.
- Bracha Karmarski is a teacher and researcher at the Bar Ilan University in Israel. She is interested in developing students' metacognitive skills in the context of mathematics education.

Why focus on relationships?

Wenger (1998) says that *situated cognition* (i.e. learning in a specific meaningful context) has both a social and a cognitive component of engagement. The next table summarises his thinking about how these components can be elaborated. As brief as it is, the table serves as a useful reminder that even seemingly individual cognition is grounded in the social (cultural) tools and interactions of a community. Seen from this perspective, learning is an act of relating to others.

Table 12 **Components of situated cognition (after Wenger, 1998)**

Type of engagement	Components	Brief description
Social	• Community	Social contexts that give meaning to actions and competencies
	• Identity	How learning changes who we are and how we participate in communities
Cognitive	• Meaning	Changing ability individually and collectively to experience life as meaningful
	• Practice	Shared historical and social resources that enable and sustain action

Sociocultural theory also posits that, in any situation, what is and can be known will be *distributed* amongst the participants, with certain "ways of knowing" embedded in the design, and history of use, of the cultural artefacts being deployed. In such situations, different "participants" (including tools) will bring different perspectives to bear and contribute different ideas. To access this potential diversity, students need the skills to interact with and consider different points of view. One benefit of this can be an increase in *creativity*. As Gordon Wells observes, "real" problems of the sort students might encounter throughout life are seldom neatly formulated and typically do not have one "right" answer. That being the case:

> …'real' problems are rarely solved by individuals in isolation; on the contrary they are typically addressed by a group that, although sharing a common goal, has varying kinds and degrees of expertise as well as diverse values, motives, interests and preferred strategies for working together. Finally, outside the classroom, whether a solution is acceptable or not is rarely decided by a single powerful arbiter but by consensus amongst participants as to whether the proposed solution allows them to advance towards the goal of the activity in which the problem arose (Wells, 2002, p.199).

Jane Gilbert identifies the creation of ideas and solutions in the "spaces" between people as an important *economic/employment* skill for the twenty-first century (Gilbert, 2005). Wells' description shows why this sort of interactive creativity can be so powerful. He also mentions in passing here that members of a group may have varying degrees of expertise. This raises the important idea from situated cognition that learning can be seen as a type of "*apprenticeship*" in which the novice learns from observation and emulation of more experienced others. As already outlined, this way of learning is embedded in other key competencies—for example as the means of becoming increasingly skilled in self-regulating learning. At the very least, these considerations have implications for the way the teacher interacts with an individual student. However the power of encouraging extended interactions between teacher and students, students and students, and out to the wider community, is also implied.

Writing about the development of the key competencies through the arts, O'Conner and Dunmill discuss the importance of developing *empathy*—"the ability to think and feel what it might be like to be other than yourself" (O'Conner & Dunmill, 2005, p. 5). They say this *affective* aspect of relating to others sits "at the centre of morality" (p. 5) and they see this as another essential competency for living in the twenty-first century, where people from different cultures have more contact with each other. From their perspective, because the arts incorporate many *non-verbal* ways of knowing, they provide a powerful alternative avenue for developing competencies for communicating ideas to other people. This argument integrates the key competency of relating to others with using languages, symbols, and texts.

Wells provides a more *cognitive* slant on thinking about the needs of others when interacting with them. Writing about the challenges of reporting progress or findings in relation to a shared inquiry learning project he notes:

> …this attempt to represent one's understanding of the object at issue so that it is clear and convincing for others, and then to respond to their questions, suggestions or objections in the

> spirit of collaboration as well as competition, is a particularly powerful mode of knowledge building that advances the understandings of both the individual participants and the class as a whole (Wells, 2002, p.203).

O'Conner and Dunmill also discuss the unique challenges of learning in contexts where there is a built-in need to work closely together:

> Playing in a musical group for example requires co-operation, leadership, discipline and artistic endeavour. Active participation in music learning activities supports a positive, reflective, appreciative environment where all contributions are accountable to a communal outcome. The music making experience is therefore one of true co-operative learning where the work produced is reliant on the interdependency and interrelationships of each and every participant (O'Conner & Dunmill, 2005, p. 12).

Similar comments could doubtless be made about playing a team sport, and perhaps of carefully structured co-operative learning activities where the "co-operation" is not just seen in terms of social roles (such as gopher, recorder, etc.). This type of consideration closely integrates relating to others with managing self and participating and contributing.

A key message of the three preceding competencies has been that, if we want students to be competent in the ways identified, they need lots of practice. This is obviously also true for relating to others.

Opportunities to learn relationship competencies

This key competency raises some interesting issues related to opportunities to learn, not just the competency itself, but to learn more generally. While also relevant to the other four key competencies, it is in this context that inclusive teaching for the diversity of students (the norm rather than the exception in today's classrooms) comes sharply into focus. Similarly, while the intention to place the key competencies the heart of the curriculum raises assessment questions more generally (see for example Hipkins, Boyd, and Joyce, forthcoming), there are some very challenging assessment issue raised by this competency when the impact of assessment on opportunities to learn is taken into account.

Caught or taught?

From the perspective of situated cognition, students can only "come to know"' as they *experience* knowledge building. Knowledge cannot be transferred directly into their heads by telling them what someone else has found out (Wells, 2002). Building knowledge of relationship skills requires the scaffolding of practice in actually using them. In this, the teacher has twin roles as planner/enabler and coach/facilitator. Opportunities for students to interact in the ways described above must be planned for. Wells recommends the creation of "communities of inquiry" where students work on real problems of authentic concern to them, in an environment conducive to sharing and interaction. (The nature of inquiry learning as a curriculum focus is explored more

fully in the next section on "participating and contributing".) The teacher plays a very active role, even when students are seen as "co-constructors" of knowledge during the inquiry process. Wells recommends a regular cycling between stages at which students work individually or in small groups on assigned aspects of the inquiry and whole-class sessions at which ideas and progress are freely shared, evaluated, and ongoing directions for action collaboratively decided upon.

The British National Education Research Forum (NERF) recently reviewed two research projects in which primary-aged children were explicitly taught skills for listening to and interacting with each other in learning conversations (National Educational Research Forum, 2005b). The researchers describe three types of talk, as summarised in the next table. Coaching in exploratory talk is needed to develop the key competency.

Table 13 **Features of student-student talk**

Type of talk	Features
Disputational	Unproductive disagreement
	Propositions are followed by challenges that lack clear resolution
Cumulative	Talk adds uncritically to what has gone before
	Characterised by repetition, confirmations, and elaboration
Exploratory	Learners actively engage with others' ideas
	Justifications are given for challenges and alternative hypotheses offered
	Progress emerges from joint critical consideration of ideas and agreement on which are best

Two aspects in common contributed to the success of these projects in improving both cognitive learning and communication competencies:

1. The children were taught to set and respect simple ground rules for their conversations.
2. They were also taught how to bring more than one perspective to bear on a question by:

- debating ideas;
- asking for other ideas;
- providing justifications when challenged; and
- offering alternative suggestions.

Learning to relate to, and learn with, diverse others

In their investigation of more inclusive teaching methods for the diversity of students in today's classrooms, Bishop and Glynn (2000) describe five Māori metaphors that could guide teaching practice. Relationships with others sit at the heart of these metaphors, as does the idea of student-centred pedagogy:

> **Metaphor 1: Tino rangatiratanga:** Parents and students should be able to take part in decision-making about curriculum planning, to the extent of sharing power over decisions about curriculum content and the directions that learning will take (Bishop & Glynn, 2000, p. 4).
>
> **2: Taonga tuku iho:** Schools and teachers need to create contexts where to be Māori is to be normal and where Māori identities are valued, valid and legitimate—in other words, contexts where Māori children can be themselves (Bishop & Glynn, 2000, p. 4).
>
> **Metaphor 3: Ako:** Rather than acting always as the 'expert' who conveys information to students who receive it, the teacher is a partner in the 'conversation' of learning (Bishop & Glynn, 2000, p. 4).
>
> **Metaphor 4: Whānau:** ...a pattern of interactions [that] will develop where commitment and connectedness are paramount, and where responsibility for the learning of others is fostered (Bishop & Glynn, 2000, p. 5).
>
> **Metaphor 5: Kaupapa:** ...a collectivist philosophy of achieving excellence in both of the languages and cultures (Bishop & Glynn, 2000, p. 5).

A recent discussion of ways the key competencies framework might be adapted for the kura kaupapa also emphasised an "abiding concern for the quality of relationships" in Māori medium educational settings (Macfarlane, Glynn, Grace, and Penetito, 2005, p.6). However some researchers warn against translating the metaphor of "whānau" into the essentialist idea that all Māori students prefer to work in groups (Hill and Hawk, 2000; McKinley, 1999). The "community of inquiry" model outlined above makes it clear that a much more rigorous interpretation is intended. Furthermore, Wells strongly suggests that teachers model the process of undertaking inquiry that is meaningful to their own learning (Wells, 2002). These metaphors are intended to guide the provision of opportunities to learn for all students, regardless of their diverse backgrounds or learning needs. Drawing these ideas together in the New Zealand context Alton-Lee (2003) synthesises evidence for the effectiveness of teaching that uses a learning communities approach for raising achievement of *all* students. She identifies specific training in collaborative group work as one characteristic of such teaching and the valuing of diversity as another.

Assessment that takes account of relationships and action

In her book on the "knowledge era" Jane Gilbert raises the challenge of finding new ways to assess group performance since this is now so important to economic activity and employment skills (Gilbert, 2005). Caroline Gipps (2002) addresses the same issue from the perspective of sociocultural theory, saying that assessment in this theoretical framework is seen as "integral to the teaching process and embedded in the social and cultural life of the classroom" (p. 83). From this perspective the "process should be assessed as well as the product" and the conception of assessment should be "dynamic rather than static" (p. 74). Gipps identifies four issues to be addressed in rethinking more traditional views of assessment as an isolated formal demonstration of learning undertaken by a solitary individual:

Assessment is interactive: From sociocultural and distributed cognition perspectives, both *tools* and *other people* help students to challenge and extend their learning, whilst also providing important aspects of the context in which students can demonstrate learning. At issue here is the sort of support students can receive during the assessment process. At the very least, Gipps recommends an "extended interaction between pupil and teacher to explain the task" (p. 81).

Assessment is socially situated: The "apprenticeship" model of situated cognition places both learning and assessment in real contexts, doing meaningful tasks rather than contrived assessment activities. Such contexts typically require interaction with others, and so the issue of how to assess group performance is pertinent. Other issues concern the provision of a range of activities that provide each student with "a wide opportunity to perform" and that may require a "range of responses other than written mode" (p. 81).

The changed nature of the assessment relationship between student and teacher: Sociocultural theory suggests a power-sharing rather than a hierarchical relationship between student and teacher during assessment. The student plays a more active role in negotiating both the task and the criteria for demonstrating learning. The actual assessment process requires a dialogue about both.

The role of assessment in identity formation: Ways learning is assessed impact on students' judgements of who they are as learners. Gipps suggests that:

> Involving pupils in evaluation of their work through a constructive process of feedback is one way in which teachers can show pupils that they are valued and respected rather than objects of classification and grading (Gipps, 2002, p.81).

This raise issues of classroom climate and ways assessment is both spoken about and enacted. Again, the nature of classroom relationships sits at the heart of the issue.

Is metacognition really necessary?

Wenger's analysis of situated cognition provides one useful lens for thinking about metacognition (see above). The meaning that is built into socially established routines and practices quickly becomes invisible when these routines become simply "the way we do things around here". Metacognitive reflection is a way of bringing deeply embedded meaning back to the surface. This idea was first introduced in this background paper as Perkins' concept of "depatterning" individual responses (see Section 2). In the context of relating to others it is social and cultural rather than individual patterns of responses that are the focus.

The research project introduced next found that explicit teaching of metacognitive strategies for use in group work resulted in definite cognitive gains for learners.

Teaching that fosters cognitive and metacognitive gains through learning interactions: a mathematics example

The research outlined here is interesting because it was designed to assess the cognitive gains made by six classes of Grade 8 Israeli students (12-year-olds) when they carried out tasks that required them to share ideas related to graph interpretation in mathematics. The design of the study also allowed the researchers to test whether the *metacognitive* aspect of interactions made a difference to students' learning gains, when compared with simply working in co-operative groups. Some classes used group tasks that had metacognitive elements built into them, while the others used co-operative learning tasks with no explicit metacognitive guidance (Karmarski, 2004).

Students in the co-operative groups were encouraged to work together to solve the graph problems but were given no more guidance than all the classes had already received in the lessons to that point. Students in the metacognitive groups were given prompts that helped them pose a full range of comprehension questions and were also taught to ask the three types of questions shown in the next table. These were designed to foster the mathematical "discourse" that Gee identified as an important element of gaining subject-specific literacy (see the section on "languages, symbols, and texts").

Table 14 **Examples of questions that foster metacognitive interactions in group tasks**

Type of question	Examples
Strategic (prompt student to consider strategies and reasons for using them)	What strategy/principle/tactic can be used to solve the problem? Why is strategy/principle/tactic the most appropriate for solving the problem? How can the suggested plan be carried out?
Connection (making connections to previous experience/existing knowledge)	What is the same as in previous graph tasks? What is different about this new task?
Reflection (monitoring the solution process)	Is the result reasonable?

The nature of interactions between students within any one group was assessed on a four-point scale. Researchers looked for instances of:

- working individually within the group;
- providing or receiving technical help, working co-operatively but with low-level cognition (e.g. "What page are we on now?");
- providing/receiving final answers with no elaboration, working co-operatively but with high-level cognition (e.g. "The slope here is different"); and

- providing/receiving elaborated explanations (e.g. "Let's measure the height of the step, the answer is 4 because the height of a one-step unit is 4").

The results reported for this study are food for thought. All groups displayed the interactive co-operative learning behaviours encouraged by the materials, and little off-task behaviour was observed. On average students from both types of groups made learning gains. But the group who were supported to both interact *and* reflect metacognitively made greater learning gains:

- They did better on the final graph interpretation test.
- They did better on a graph construction task that required them to transfer their knowledge of graphs to a new type of situation (even after their greater gains in graph interpretation had been allowed for).
- They provided and received elaborated explanations more often.
- They displayed fewer mathematical misconceptions by the end of the unit.

The researcher concluded that small-group learning tasks need to be carefully structured if the evident benefits of adding a metacognitive dimension to students' interactions are to be achieved (Karmarski, 2004).

Interactions can be with parents

The NERF research bulletin recently reviewed a project in which teachers in one school designed interactive homework activities for parents and their children, aged 7–8 years, to share. Parents were briefed in how to use the activities, which were designed to enhance reading skills by considered use of reasoning strategies. Another school used the same activities but without the parent briefing. The children's reading skills were tested at the start of the project and again after four weeks. The children in the first group showed a nearly fourfold improvement compared to the children in the group whose parents were not briefed (National Educational Research Forum, 2005a).

As for the graph task described above, such research shows that it is not just the design of the tasks that enhances metacognition. The users of the tasks need to be taught about their special features, and how to use them. A recent systematic review of 23 different thinking skills initiatives came to the same conclusion, reporting that:

> The role of the teacher is especially important in establishing collaborative group work, in developing effective patterns of talk and in eliciting students' responses (National Educational Research Forum, 2005c).

6. Participating and contributing

An overview of this competency

Participating and contributing is about participating actively in local, national and global communities, including places of learning, work and recreation, which may be based on kinship, interest or culture. The competency includes a capacity to respond appropriately as a group member, to make connections to others, and to create opportunities for including people in group activities.

Students who have developed ways of belonging in a range of contexts will have the confidence to participate and contribute actively in new roles. They understand the importance of balancing rights, roles and responsibilities, and of contributing to the quality and sustainability of social, physical and economic environments. (Taken from the draft curriculum definition, April 2006.)

This competency is about learning that is *authentic* (see below for a discussion of what this term means in this context). Students need to be ready, willing, and able to make the transfer between what they already know and can do, and what they might do next or in the future, and to locate their own actions in personal, local, national, or global contexts, as appropriate.

The discussion of the key competency "managing self" noted that active participation in learning is one indicator of *engagement*. However, as the Fredricks' review of school engagement pointed out, there is a continuum of possible reasons for participating, from compliance in response to extrinsic factors, to deep intrinsic engagement with learning for its own sake (Fredricks et al., 2004). Willing compliance, while conducive to a productive classroom learning climate, will not necessarily lead to the development of dispositions needed for lifelong learning. Thus the challenge for teachers is to provide for at least extrinsically motivated participation that "gets students started". The goal is to also aim for the deep intrinsic engagement that could lead students to show the dispositions of lifelong learning—that is, to use their learning in wider contexts that have personal meaning and value for them.

At one stage of the development process this key competency was called "belonging". There is an important identity component here. Who we already are influences our learning and what we do with our learning influences who we become. People who feel they "belong" in a particular context are more likely to see ways they can participate and contribute, and they are also likely to be more willing to do so. But this relationship is not necessarily straightforward. Looking at the links between students' achievement at secondary school and their sense of belonging, the recent international OECD PISA analysis pointed to New Zealand as a nation where between 19 and 37 percent of students in each secondary school reported low rates of participation in *classroom* learning. These are high rates by international standards. By contrast, compared to other nations,

relatively few students felt they did not belong *at school* (OECD, 2003). Learning at school can of course take place in both informal contexts and through planned extracurricular activities. Clearly it is desirable that students see a place to belong in these wider school settings, but who would argue that this provides them with sufficient opportunities to learn? The OECD findings suggest a need to build on successes in helping students from many backgrounds feel there is a place for them at school by also meeting their *diverse learning needs* in ways that actively engage them in the classroom.

A note about theoretical sources

Leading researchers and research projects used to inform this section include:

- Lynn Davies has spent many years researching citizenship education in the UK and internationally, as has Ian Davies (who lives in a different city and appears to be no relation).
- Wolff-Michael Roth and Jacques Desautels are Canadian teacher educators with a longstanding interest in making school learning more authentic for the full diversity of students in schools.
- James Beane is an American educator who is well known in New Zealand as an advocate of middle school reform via curriculum integration. He often works and writes with Gordon Vars.
- Ken Tobin is an American teacher educator who has pioneered the active involvement of inner city students in researching their own learning needs as a means of helping their teachers cope with difference and diversity in students cultural backgrounds.
- Sandra Duggan and Richard Gott are UK researchers who investigate relationships between the science that students learn and the science that is actually used in real-life settings. In the project reported here they were joined by Russell Tytler, an Australian science educator.

Why focus on participating and contributing?

A common theme in the above sections is that students need opportunities to *actively* develop the key competencies. Development of higher-order thinking skills requires lots of practice, in many contexts. The complexities of languages, symbols, and texts are unravelled as students use them in meaning-making tasks. Providing choices and conferring responsibilities helps students develop competencies in self-management. Practice in many kinds of interpersonal interactions helps students hone their relationship-building competencies. However none of these benefits will accrue by osmosis. Providing opportunities for activity is not sufficient in and of itself. Thus a complementary key theme in the above sections is that these competencies are taught, not caught, and that teacher planning, modelling, and scaffolding of emergent and developing competencies is critical to success. Viewed from the perspective of this set of teaching challenges, the key competency "participating and contributing" can be seen as providing a focus for planning for meaningful "action" that brings all the other key competencies together.

The stated intention for all the key competencies to foster *lifelong learning* also impacts on the way this particular key competency is interpreted. Jay Lemke (2002) strongly critiques the school practice of teaching content when what we should be doing is actively supporting students to become the people they aspire to be—to develop identities that will last well beyond school. He says "what matters to the formation of an identity is activity that is reinforced over the long haul, and fairly frequently" (Lemke, 2002, p. 41). This is a useful reminder that, like the key competencies already discussed, this one will need active and ongoing practice if its later benefits are to be realised through school learning.

Gilbert's analysis of changes in the knowledge era adds another important dimension to the imperative for student participation in authentic activities. She says that knowledge has changed from being a "thing in itself" (which can be stored up during learning) to being thought of as the raw material with which we can *do* things. Rather than being valued for its own sake, knowledge is valued for its *performativity*—that is, its ability to be used in new and innovative ways to achieve new ends. In this view, new knowledge generation is no longer the preserve of experts who have served a lengthy "knowledge apprenticeship". Students of all ages need chances to be performative—to do things that create genuinely new knowledge. In this way will they learn about metacognitive dimensions such as where knowledge comes from, who decides what is worth knowing, and how tacit "rules" of knowledge construction operate in different situations. They will need to know these things to be able to participate actively in the "knowledge society". While there will be obvious economic benefits from the contributions of citizens who are so engaged, there are also personal benefits in terms of material comfort and wellbeing. Thus, as for the other key competencies, social justice suggests that this key competency should be part of the learning entitlement of all students (Gilbert, 2005).

What does this competency actually encompass?

The commonly cited characteristic of participatory learning is that it should be authentic. However this begs the question "authentic for whom?".

Authentic to a discipline area

The most familiar meaning of "authentic" is that the learning is carried out in a way that matches, as much as possible, the way an expert in that discipline area would work. For example, children might be told they are being "real scientists" when they set up simple investigations such as fair tests. This is, however, somewhat misleading. Chinn and Malhotra (2002) identify all the ways that students' typical science investigations are *not* like the research activities of working scientists. One telling difference is that scientists begin from a position of deep knowledge of the question they are addressing. Their inquiries seek to build new knowledge in an area in which they are usually already immersed. By contrast, students often "research", or "experiment" to learn about something they did not know before (but other people did). The same critique could be made of other curriculum areas.

Some researchers who have addressed this issue recommend giving students rich opportunities to explore the *contexts* in which their learning will be set, *before* they begin the planned "authentic" learning activities. For example, one group of researchers recommended that students learn the key ideas of an historical issue before they experience ways to research it "like a real historian" (for example, by comparing multiple information sources) (Stahl, Hynd, Britton, McNish, and Bosquet, 1996).

Lemke (2002) challenges the idea that students can become meaningful participants in societal activities simply by emulating them. In fact, he says, many types of school learning are a "bridge to nowhere" (p. 37) because they are too different from activities that take place in the world outside school. Illustrating this difference, one team of researchers investigated the knowledge needed to address a real controversy. Their example documented a heated debate about safety issues related to a specific type of industrial pollution in a small British community (Tytler, Duggan, and Gott, 2001). They concluded that the "pure" science typically taught in school was not particularly helpful in the messy real situation where important evidence could come from a range of perspectives:

- "scientific" evidence (subject to debate concerning sampling protocols and the like);
- "informal evidence" based on the common sense observations and experiences of people in the local community; and
- broader questions of values in relation to the onus of proof, the setting of acceptable levels for emissions, and so on.

These researchers concluded that students needed *something different* from a traditional science education if they are to gain the confidence to become active participants in such disputes. Arguably the second and third of their layers relate more directly to the social studies area of our curriculum, illustrating the likely need for *curriculum integration* when exploring authentic contexts.

This is not to say that students should not get involved in activities where participation leads to the mastery of "big ideas" from our existing knowledge inheritance, when and as appropriate. Tytler and his colleagues pointed out that the key leaders of the community campaign in their case study all had a broad knowledge of science although none were scientists (Tytler et al., 2001). The caution is that activities that meet this knowledge acquisition purpose are not *sufficient* to prepare students for participation as active citizens, or indeed for lifelong learning. So care is needed to ensure that "authentic participation" is not read as simply being "hands-on" learning in traditional knowledge acquisition activities.

Authentic to the student

Learning that addresses questions of compelling interest to students can be said to be authentic for them. But as Roth and Desautels (2004) point out, the things that some students are good at and interested in—for example, skateboarding—may not be what we value as learning outcomes. In

that case, what is personally meaningful may not apparently contribute to longer-term citizenship and participation goals either.

Illustrating this tension, a principal of a secondary school recently noted that attempts to develop an integrated Years 9 and 10 curriculum based on themes such as "space" or "magic" became too contrived to sustain the learning demands of each discipline area. However, discussion of this dilemma with the students led to a rethinking of the vehicle for curriculum integration. Students wanted their learning to address big questions such as "Who am I?" The faculty leaders shifted their planning focus to such questions and found this a much more satisfactory way of introducing authenticity to the curriculum. Their solution resonates with recommendations made by curriculum theorists like James Beane about meaning contexts for curriculum integration (see below).

Authentic to the student and society

Many curriculum theorists define authenticity by saying that learning should be meaningful at both the *personal* and the *societal* level. Roth and Desautels (2004) give the example that students could build on their interest in skateboarding to inquire into safe places for skateboarding and to act on what they find, or to design personal health and fitness goals that relate to their skateboarding activities. In this case a non-traditional context serves learning intentions that have a much broader reach.

More challengingly, Roth and Desautels make the point for not using the reverse situation—that is, engaging students in researching and discussing contexts and issues that are pressing for others, but not yet personally meaningful for the students. An example might be discussing ethical dilemmas faced by parents of a child with a specific genetic condition. While students might well be interested in an academic way, there would likely be little they could personally do to address the relevant ethical issues. Rather than being able to participate in investigations that lead to decision making or action, they are like voyeurs in the dilemmas of others.

As the case study by Tytler has already shown, contexts that are authentic at both personal and societal levels typically draw on more than one curriculum area. James Beane has long argued that they are the most appropriate vehicle for *curriculum integration* (Beane, 1997). In the next table, his colleague Gordon Vars compares 10 "themes" advocated by Beane with the idea of "problem areas" or "centres of experience" identified by another American research team (Vars, 2001). As the table shows, 10 Beane's themes recur and regroup differently in different contexts.

Table 15 A comparison of contexts seen as authentic by two leading proponents of curriculum integration

War, Peace, and International Relations	Interdependence, Conflict Resolution
Overpopulation, Pollution, and Energy	Interdependence, Wellness
Economic Options and Problems	Social Structures, Commercialism
Governmental Processes	Independence, Justice, Institutions
Consumer Problems	Commercialism
Intercultural Relations	Social Structures
World Views	Interdependence, Social Structures
Recreation and Leisure	Wellness
The Arts and Aesthetics	Identities
Self-Understand and Personal Development	Transitions, Identities
Family, Peer Group, and School	Interdependence, Caring, Institutions
Health	Wellness
Vocations	Social Structures
Communication	Interdependence, Commercialism
Alternative Futures	Transitions
Source: Van Till (1976, p. 197)	Source: Beane (1993, p. 61)

Source of table: Vars (2001)

With topics such as "self-understanding and personal development" and "intercultural relations" this table again illustrates how "participating and contributing" in authentic contexts has the potential to draw all the other key competencies together in an integrated learning experience. Vars makes the point that as well as addressing cognitive outcomes, learning in such contexts can result in "love of learning, concern for other people, critical thinking, self confidence, commitment to democratic group processes, and a whole host of other so-called 'intangibles'" (Vars, 2001, p.3).

What this looks like in New Zealand contexts

Encouragingly, this wider meaning of authenticity is already modelled in a range of New Zealand curriculum areas and learning innovations. The following examples have been included to prompt reflection on aspects of the curriculum that already provide learning opportunities to address the key competencies. It may be that a refocusing of the planned learning in these areas could bring the key competencies into a more central place in the intended learning.

Action competence: *Health and Physical Education in the New Zealand Curriculum* (Ministry of Education, 1999b) defines action competence as "personal skills that empower them [students] to take action to improve their own well-being and that of their environments" (p. 32). It is linked to a "critical action cycle" in which students learn how to frame, research, then act on critical questions concerning the "physical and emotional environments in classrooms, whole schools, communities and society" (p. 32). The examples given in the supplementary curriculum documents that support this learning area suggest authentic contexts and questions that are appropriate for even the youngest learners (Hipkins, 2005).

Education *for* the environment: This concept, introduced in *Environmental Education Guidelines* (Ministry of Education, 1999a) differentiates authentic participation when addressing environmental concerns from education *in* the environment (experiential learning) or *about* the environment (content learning). There is an emphasis on taking actions that contribute to the sustainability of our environment. Examples of some programme initiatives that model authentic participation in addressing environmental concerns include the Royal Society's Waterways project and the Auckland Regional Council's Enviro Schools and Wai Care initiatives. There are many others and, again, they provide suggestions for the learning of students of all ages.

Cycle of action and reflection in the arts: *The Arts in the New Zealand Curriculum* (Ministry of Education, 2000) also introduces the idea of a cycle in making art works. The cycle involves designing, creating, and performing a work (in separate or combined arts disciplines) and then reflecting on its impact in relation to the "broader societal context of the arts—for example, whether it conforms to, confronts, or extends contemporary practice and cultural traditions" (p. 89). Here participation is creative, and linked to different cultural contexts.

Education for enterprise: Characteristics of education that fosters entrepreneurial activity are outlined in the Education for Enterprise community on TKI[7]. They include building the capacity of students to take responsibility for their own actions to the benefit of themselves and the community (see www.tki.org.nz). Case studies on this site provide examples of student learning activities that fulfil the "authenticity" condition of being both personally and socially meaningful. For example, in one school, as part of their social studies learning, Year 10 students researched then undertook a series of initiatives to improve relations between the school's students and the elderly people in a neighbouring retirement village.

[7] Te Kete Ipurangi (www.tki.org.nz)

Problem solving in technology: In one of the recent Curriculum Innovation Projects (Boyd et al., 2005), Year 11 students in one school completed NCEA assessments by working with people in their local community to design and deliver technological solutions for authentic needs. For example, some students designed and built web pages for community organisations, consulting with them at each stage of the process.

Participating and contributing as education for citizenship

The idea of authentic participation is often linked to notions of citizenship education. There are some tensions to be discussed here. During the initial curriculum consultation this key competency was interpreted by some as a call to political activism (and therefore as either impractical or dangerous). While the idea of "participation" obviously does not rule this out, activism on political issues is at one end of a continuum of ways of using new knowledge and skills. The above examples highlight the wide range of other types of possibilities for participating and contributing in authentic ways. Lynn Davies (2006) suggests that community service, provided it helps "create a self-identity as a person who can influence things" (p. 18), can be an effective form of active participation for citizenship education. However she warns against interpreting this as activities such as picking up rubbish at school, which can just as easily be seen as a form of punishment if students have not been involved in the decision making that led to the action.

Ian Davies and John Issitt recently reviewed published materials for citizenship education in Australia, Canada, and the UK. They found that:

> Citizenship education is prone to somewhat contradictory impulses. On the one hand the justification for its development rests on the need for greater participation in order to strengthen democratic structures and processes further; on the other hand, citizens are perceived as subjects to be moulded to state authority. … The citizen is free and not free at the same time (Davies and Issitt, 2005, p.405-406).

This is as true of students at school as it is of citizens in general. Any "authentic" action they plan and take may be seen as a risk if it interrupts the smooth running of the school, or challenges the authority of teachers. A recent example might be some reactions to the situation where older students from a number of Auckland schools took time out from one afternoon's lessons to join a protest action on the low wages paid under youth rates. If the decision to do this was linked to an informed position on the social justice issues raised by youth wage rates, these young people were demonstrating the citizenship qualities that the research suggests should be (but are unlikely to be) outcomes of school learning for citizenship (Davies, 2006).

A related tension concerns the balance between individual and societal benefits of any action taken. Entrepreneurial activities, for example, may generate benefits for the innovator at the expense of social wellbeing. Certain types of contributions to the classroom could benefit the individual while disrupting the learning of others. Participatory activities potentially fall anywhere on a continuum from complete selfishness to total altruism. Addressing this issue, Davies and Issitt found that published material for citizenship education is likely to emphasise individual responsibility, while downplaying the constraints and responsibilities beyond the control of the individuals. They found a pattern of curriculum material that:

> …focuses on national rather than global issues, that diversity is given only limited attention and that most of the pedagogical processes that are implied by the books seem, largely, to favour cognitive thinking or reflection about personal issues as opposed to active involvement in political issues (Davies and Issitt, 2005, p.399).

They concluded that "any fears about citizenship education becoming the source of activism by extremists seems hopelessly misplaced" (p. 406).

While this finding might be reassuring for some, Roth and Desautels (2004) raise an interesting counter-challenge, framed from the sociocultural perspective. If learning is seen as situated, then competence *emerges* in the situation—it is not something people can carry around in their heads. For example, citizenship competencies can only be demonstrated in situations where they are called for. The competence exhibited is a feature of the interactions that take place in that context, not the sole property of an individual person. There are obvious implications here for assessment, which has traditionally gathered information about what is in individual students' heads.

Another challenging feature of this theoretical perspective is that the "situation" may not call for everyone to demonstrate equal competencies (which again is what we have traditionally assessed as educational outcomes). As Roth and Desautels say, "different individuals contribute in their own ways to make events recognisable for what they are" (p. 22). Even those at a public meeting who are willing to go along and provide support and applause for their community speakers, or just to hear the range of views expressed, actively contribute to the emergence of citizenship in that setting. There are obvious links here to the key competency "relating to others".

Lynn Davies recently reviewed a wide range of curriculum recommendations for citizenship education. Her findings add another perspective to the interpretation made by Roth and Desautels, and draw attention to the dispositional aspects of key competencies. As she says:

> One can have emotions and identities without having to do much about them. Citizenship implies a more active role (Davies, 2006, p.6).

She goes on to reiterate that empathy is not enough and that content-focused learning is not an adequate response to the challenge of preparing students to be active citizens who will be willing and able to take action to address issues of concern to them. She concludes that ongoing practice is needed if the competency is to develop and be sustained, and she emphasises that developing the dispositional aspects is the greatest learning and teaching challenge. This should not be read

as saying that discipline-based learning is not needed, only that it is not *sufficient*. Thus, with differences in the specifics, her challenge matches that made by Tytler and his colleagues (see above). We will return to the focus of possible learning programmes shortly.

"Activism" in the school context

Lynn Davies says there is general agreement between researchers in citizenship education that the best predictors of whether people become active citizens later on (which she defines as either being active in voluntary work, or taking part in activism) are:

- involvement in school democracy; and
- experience of doing some form of community service.

She says they should "experience democracy and human rights in their daily lives at school—and not just be told about it" (p. 16). However she also notes that this can be a vexed issue for schools if it is perceived that there is little room for students to experience autonomy in their learning. The following examples suggest ways such autonomy can be fostered, even within a relatively traditional learning programme.

Most New Zealand teachers are now very familiar with the idea of formative assessment to inform learning. Active participation of students in making decisions about their learning needs should be a part of this assessment process. Ginette Delandshere (2002) develops this idea in her discussion of assessment as a form of enquiry. She suggests that assessment should ask first and foremost "What does it mean to know?" and that teachers and students should participate in answering this question together. Students are encouraged to be proactive, not reactive, by participating in making sense of their own learning progress and needs.

Elmesky and Tobin (2005) describe a different type of active involvement in learning. Responding to the diverse learning needs of black American students from inner city schools was a challenge for predominantly white teachers. This project supported the students to develop the skills to carry out ethnographic research in their own communities and amongst their peers, using techniques such as digital story telling. Sometimes the focus was on bringing the wider community into the classroom, helping the teacher to understand the perspectives and life experiences of these students whose backgrounds they did not share. Sometimes the focus was on the students' interpretation of their classroom learning per se, again helping the teacher to see how the planned learning activities connected (or not) with the reality of the students' lives. Such projects provide a very different slant on the issue of "activism", drawing students' empowerment closer to the planned curriculum.

A similar intent underpins the Te Kōtahitanga project in New Zealand schools (Bishop, Berryman, Tiakiwai, and Richardson, 2005). This project uses Māori students' stories of their learning experiences at school to encourage teachers to adopt new teaching approaches that better meet the diversity of learning needs of students in their classes. For example, at a recent international conference, Adrienne Alton-Lee gave the example of:

> …a change in the assessment system in one mathematics classroom to afford students credit not only for successfully learning concepts, but also for demonstrating effective teaching of a concept to another student. Students who have been absent are at a premium with other students, and everyone can catch up if classes are missed through illness—a critical issue in mathematics where new learning is so dependent upon prior domain-specific knowledge (Alton-Lee, 2005, p.18).

In Te Kōtahitanga students talked to researchers, who then shaped the stories to share with teachers, and the teachers decided what to do next. In Tobin's project at least some students *were* the researchers and actively participated in all such decisions. A recent research project in three Palmerston North secondary schools had elements of both these models of student participation. In these schools, students worked with an outside researcher to investigate learning in their classrooms and this led to shared conversations about what was effective, in which the participating teachers, students, and the researcher all took part.[8]

Opportunities for learning

Caught or taught?

A strong active dimension is implied by the very name of this key competency! However it is also clear that doing things per se will not necessarily help students extend their competency to participate thoughtfully and constructively in the wide range of situations they may encounter. Suggestions of specific knowledge and skills to be developed strongly suggest the necessity for teaching that scaffolds and supports students as they learn.

Davies (2006) lists the following as important learning outcomes (based on the work of the West Midlands Commission on Global Citizenship, of which she is chair). The links to most of the key competencies are striking:

- an understanding of our commonality with people in other places;
- an understanding of interdependence;
- 'a critical spirit' … the ability of young people to think for themselves;
- 'an inclusive sense of belonging' and a sense of self esteem;
- an awareness of 'multiple identities' [our own and as a community];
- the valuing of diversity; and
- the confidence and skills to respond to change (WMCGC, 2002, cited in Davies, 2006, p. 10).

Roth and Desautels (2004) point out that early attempts at authentic participation are as likely to lead to failure as to increased competence. They say that teachers need to encourage continuing

[8] This project was called "Making sense of learning at secondary school: an exploration by teachers with students" and was led by Ruth Kane, from Massey University. The full report will soon be available on the TLRI section of the NZCER website www.nzcer.org.nz

participation at a level that matches the students' existing competencies, and students need to see themselves as part of a larger collective while their learning is ongoing. As they know more, they will be able to do more. As they do more, the situation changes. As they put it: "changing participation in a changing world is equivalent to learning" (p. 20).

This is an important reminder that opportunities to learn in "authentic contexts" need to be underpinned with considered attention to deliberate teaching/coaching/practising activities. While the context can provide for engagement and relevance, the teacher must plan for scaffolded learning of concepts, skills, and values where relevant.

General or subject-specific programmes?

As already noted above, the cross-disciplinary nature of real-life situations suggests that learning will need to integrate both subject-specific and more general components, or integrate concepts and skills from two or more discipline areas. Illustrating this challenge, Roth and Desautels (2004) explore what "scientific literacy" might look like in the context of a controversial community issue. They describe a range of competencies that students will need to develop if they are to be able to use their science literacy for democratic purposes in their adult lives:

- knowing how, and being willing to make good use of experts;
- knowing how to find and draw on a variety of resources, including the "local expertise" of involved members of the public;
- knowing how and when to draw on knowledge from many discipline areas, and from the "know-how of everyday life";
- being willing and able to exercise autonomy in making judgements;
- being able to communicate ideas and positions clearly and to negotiate over outcomes; and
- coping with situations, and responding appropriately.

Tytler and his colleagues suggest that controversial community issues may initially be too hard for students to cope with. They suggest the use of carefully designed case studies that help students develop their participatory skills in contexts that are authentic in origin but not too complex. There is a clear role for teacher expertise in doing this work, and it may be that secondary teachers could collaborate across disciplines when necessary.

Finally, it is important to reiterate that extracurricular learning, responsibilities in wider school contexts, and community service also provide opportunities to learn thought participation and contribution. UNESCO's Delors report emphasises the importance of "learning to do" in these wider contexts for developing initiative and personal competence (Delors, 1996). Framed from a sociocultural learning perspective, it is up to the whole school community to provide and support this wide range of learning opportunities for all students, in the expectation that the students in turn can and will challenge and extend their current competency levels.

7. What will it take to implement the key competencies?

This section poses issues for debate in ongoing professional conversations about the implementation of the key competencies as a central organising feature of New Zealand's curriculum framework. It begins with the assumption that curriculum content debates are likely to ensue if content reduction is seriously addressed, and briefly touches on wider philosophical debate about the nature of knowledge. Next, issues for locating the key competencies within the wider curriculum are outlined. Finally, the discussion turns to more practical matters and outlines likely implementation challenges when the key competencies are seen through practitioners' eyes.

Thinking through the knowledge challenge

Making space for the key competencies in a crowded curriculum cannot be a token gesture. The preceding sections suggest a profound refocusing of curriculum priorities will be needed, moving away from prioritising content acquisition as the primary purpose of learning. However, the complexities of achieving content reduction from the traditional curriculum should not be underestimated. On one level, those who are convinced of this necessity can make it sound easy. Here is sociolinguist Jay Lemke, giving a keynote address to an international audience of science educators:

> If there are truly fundamental principles in science, then the extended study of any few topics in science will eventually bring students into contact with those principles. (And if not, then they were not really so fundamental, were they?) (Lemke, 2005).

The context of his full address makes it clear that by "topics" he means "authentic" learning situations, as discussed in Section 6. While the commonsense in this approach has appeal, the danger is that curriculum planning may appear to be capricious and opportunistic. This is unlikely to be what Lemke intended, but the accusation of "anything goes" relativism seems certain to be levelled by traditionalists at any attempt at content reduction that does not explicitly address the challenges of initiating students into the hard-won knowledge of our intellectual heritage. What knowledge matters most and why? Answers are unlikely to ever reach consensus as long as a list of "topics" or even "concepts" is suggested by this question. Neither will such an approach address the issue of more fully involving students in decisions taken at the curriculum planning stage. Perhaps a different approach is needed.

Several sections of this report introduce the idea that *meta-knowledge* of the discipline areas is important to the development of key competencies. Gilbert (2005) refers to this as learning about

the "rules of the game" of knowledge construction in different disciplines. Meta-knowledge might serve as a useful guide to content reduction—or at least to the development of new principles by which this might be achieved. Learning about the *nature* of the subject is the focus intended when the phrase "multiple literacies" is used to refer to, for example, scientific, statistical, visual, or technological literacies, to name just a few. A focus on the nature of the subject provides one potential means of addressing the challenge of relativism because understanding what counts as a quality knowledge claim in a specific area is a useful guard against uncritical acceptance of any old argument. However, the challenges of learning how to use meta-level knowledge critiques should not be underestimated (see for example Norris, 1997). It would seem important that *teachers* are helped to explore meta-level understandings of the subjects they teach, and that new curriculum materials are developed to support this as a curriculum focus for students of different ages.

The preceding sections have highlighted the need for teachers to provide opportunities to learn that take account of the diverse needs of students in their classes. One particularly challenging aspect of acceptance of, and support for, diversity, is that different cultures may bring different ways of knowing and personal beliefs to any one topic or idea. Again, the challenge of relativism could be levelled at an uncritical acceptance that all ideas are of equal value. Opening up the curriculum to knowledge systems other than the Western European thought that currently dominates the traditional school "canon" again poses meta-level challenges for determining how "truth" is established, and for careful consideration of the type of knowledge that will best meet the learning demands of any specific situation. In some situations traditional knowledge will be very important (for example in judging the worth of scientific claims). In other situations local and diverse knowledges might be more important (for example in deciding what to do in a situation when individual interests potentially conflict). As Section 6 showed, learning through authentic contexts will inevitably further highlight these issues. Teachers should not be expected to be ready to address them without the support of ongoing professional conversations.

Bruno Latour, a French sociologist of knowledge, recently commented on new challenges that have arisen from post-modern academic work that critiques the dominance of certain ways of establishing "facts" in the world (Latour, 2004). Such critique, he says, has inadvertently supported those who would use relativist arguments to deny the impact of certain aspects of human activity in the modern world for their own self-interest. He gives as an example the denial of the possibility of global warming on the grounds that it is an unproven "theory", even while evidence of its reality continues to accumulate. He suggests that the focus on what is true should shift from "matters of fact" to "matters of concern" so that the knowledge focus turns to impacts of human activities and to our inter-relatedness to each other, other living things, and to the natural environment. This is precisely the more *ecological* focus suggested by Brewerton's initial analysis the key competencies (see Section 1 and below), and so could provide a new way for reframing curriculum knowledge debates. However the deep philosophical arguments that underpin such arguments would be very new for many educators. Both time and opportunities to learn would be important—exactly as for the key competencies in the classroom situation.

Locating the key competencies within the wider curriculum

Recently Professor Alan Reid described three ways implementation of the key competencies in a national curriculum might be likely to proceed (Reid, 2006, pp.9-10):

1. **"Name and hope":** Policy work goes no further than identifying the key competencies for the curriculum framework. Schools and teachers are left to work out how to enact them in practice.

2. **"Raising consciousness":** Each subject is required to design an approach for inclusion of the key competencies in learning. Reid commented that while this forces teachers to think about them, fundamental relationships between key competencies and traditional *disciplines* remain unaddressed.

3. **"Embedded":** Curriculum support documents for each learning area are designed to illustrate links to key competencies (for example by specifying which competencies will be addressed in which topics). Reid commented that this model runs the risk of atomising the curriculum and renders the key competencies subservient to the knowledge focus of the learning areas.

All of these models are predicated on a traditional view of curriculum in which knowledge acquisition is the main aim of learning and organisation of curriculum knowledge is the main focus of debate. In place of these three interpretations of the dominant model, Reid proposed an alternative view of curriculum in which knowledge becomes the vehicle through which teaching for key competencies (which Reid preferred to call capabilities) becomes the main focus of curriculum planning and implementation.

In such a model:

- the key competencies need to be understood and developed holistically;
- they are richly described and not atomised as a set of separate outcomes;
- each key competency is seen as a whole, not just as the sum of its parts;
- planning takes account of the whole, even while focusing on a specific part;
- there are dynamic interactions between the key competencies and curriculum content—there is debate about which key competencies are best developed in conjunction with concepts that are seen as important;
- content knowledge is introduced as a vehicle for the key competencies, as well as being an end in itself; and
- types and forms of assessment reflect this wider focus, and do not only address content acquisition.

Reid suggests that such a focus would alter the nature of curriculum debate. He has speculated about the wider benefits of his proposed implementation model and those ideas are briefly outlined here because they may help inform ongoing debate in the implementation stage for New Zealand's curriculum.

Equity issues could be more meaningfully addressed if key competencies provide a unifying curriculum focus while simultaneously allowing for difference to be addressed when planning learning experiences to meet diverse student needs:

> Thus rather than understanding equity as a curriculum that is common to all—an approach that invariably favours those students whose knowledge is selected as the common/core knowledge—or as providing diverse subject offerings—an approach that invariably results in hierarchies of subjects—the competencies-based approach seeks to promote 'unity in difference, rather than disunity through sameness' (Reid, 2006,p.14, also citing Kelly, 1995, p.10).

In support of this viewpoint, the discussion of the five competencies in the preceding sections of this paper emphasised the importance of providing opportunities to learn for *all* students, and reported that this is also seen as a social justice issue by other international curriculum commentators.

The pervasive **academic/vocational divide**, in which knowledge is seen as hierarchical, could be more effectively reframed once subjects become the *vehicle* for development of the key competencies, not the main focus of the curriculum. Such a reframing also better accommodates changes in knowledge over time. However, as noted above, considerable discussion of the relationship between the key competencies and the traditional disciplines is needed if this is to be realised in practice. Papers commissioned during the Curriculum Maratuanga Project have begun this discussion within the disciplines—for example O'Conner and Dunmill's (2005) discussion of the relationship between the key competencies and the arts was introduced in the section on "relating to others". As well as continuing this set of conversations, there will need to be discussion *between* the disciplines because, as noted in Section 6, authentic learning situations are likely to draw on knowledge from more than one discipline area.

Other **traditional binaries** could also be dislodged in time. For example, unproductive debates about breadth of curriculum versus depth and specialisation, or about disciplinary versus interdisciplinary learning, or theory versus application, would all become less contentious as *both* aspects of each pair would be seen to be necessary. The decision about which half of the binary was the appropriate focus in any specific situation would be a professional one, to be taken at the classroom level, in the context of the planned and unfolding learning. Similarly, debates about whether curriculum reform should be directed from the top-down or from the bottom-up would no longer be meaningful because in a non-hierarchical structure each level of the educational system would have a role to play. This idea is further explored shortly. Reid did not mention the pervasive mind/body binary, but as the preceding sections show, it will be important to address this also if rich understandings of the key competencies are to be developed within the intended sociocultural framework. This, too, has been noted in feedback to the Ministry of Education about the relationship between the key competencies and specific learning areas (Rutherford, 2005).

Accountability measures could take more educative forms as their scope broadens beyond basic literacy and numeracy. Both of these would be embedded in a wider set of capacities that focus on

aspects such as "communication". The discussion of "using languages, symbols, and texts" in Section 3 specifically highlighted the complexity of these issues.

The notion of **lifelong learning** would be better grounded than at present. There is a need to keep developing key competencies throughout life because competence in one situation does not necessarily ensure competence is another and the twin processes of adaptation and reconciliation are ongoing (see Section 1). A curriculum devised to focus on development of the key competencies would continue to have relevance well beyond school, unlike some current knowledge foci. Reid speculated that curriculum planners could develop "educational impact" statements that anticipate these lifelong learning benefits in a similar way to the "environmental impact" statements prepared for economic activity.

Learning how to teach for effective development of key competencies requires a lot more **discussion**. This topic could provide a productive avenue for ongoing professional conversations and at the same time could be used as a means of democratising the curriculum by drawing members of the wider community into curriculum conversations.

What will it take to implement the key competencies?

For Reid, the key competencies should not be seen as fixed, but rather should be seen as curriculum *aspirations,* with considerable professional discussion and curriculum development work needed if the potential benefits of the proposed model are to be realised.

The apparent near demise of the New Basics project in Queensland suggests a need to proceed carefully, and to involve the whole education sector as fully as possible. The New Basics initiative attempted to place "rich tasks", not unlike the "authentic tasks" discussed in Section 6, at the heart of the taught and assessed curriculum (Queensland State Education, 2000). High levels of resources supported this project in its early years, and the current situation suggests that sustainability was dependent on that support continuing rather than being phased out.

The New Basics project set out to deliberately align curriculum, pedagogy, and assessment (see for example Lingard and Mills, 2003). However, when introducing the 2006 NZCER conference day[9], the invited facilitator Tony Mackay added two more factors to this list. In his view any initiative to successfully introduce key competencies would need to allow for alignment of curriculum, pedagogy, assessment, *learner orientation*, and wider educational *contexts*. This final section of the report is structured to take heed of that advice. It takes an ecological approach to the implementation challenges, both because this seems like a good way to integrate diverse perspectives into a linked and richly complex picture, and because ecological approaches in any context focus clearly on issues of sustainability.

[9] Key Competencies: Repackaging the Old or Creating the New? NZCER annual conference, Wellington, 18 April 2006.

Taking an ecological approach to curriculum challenges

The first section of this report noted that descriptions of the key competencies emphasise their holistic and contextual nature and cited Brewerton's discussion of the implications of taking an ecological approach to the development this curriculum initiative:

> …taking an ecological or 'contextualist' approach to learning and living, where young people's learning is seen to be influenced by the various contexts of their lives (microsystems), the interactions between the contexts (mesosystems), and by the secondary and wider influences on those contexts (exo- and macro-systems). This perspective reflects the widely supported ecological approach of Brofenbrenner that underpins NZ early childhood education as expressed in Te Whāriki: Early Childhood Curriculum (e.g. Nuttall, 2003, 8–9). It also reflects the sociocultural perspective on learning, which suggests all learning is mediated through cultural tools, primarily language (Brewerton, 2004b, p.7).

Complexity theorist Brent Davis (2004) identifies three layers of social organisation that match to, and extend, this idea of micro-, meso-, and macro-systems:

- Individuals construct their unique embodied meaning for the events they experience (the micro-system level, here equivalent to the classroom).
- At the same time, through their participation in events, they contribute to the building of collective knowledge (the meso-system level, here equivalent to the school).
- Both ways of knowing are informed by cultural identity at a yet wider political level of knowing (the macro-system level, equivalent to the wider community, and the national level).

These layers, visualised as concentric circles, can also be seen to represent organisation of both contemporary and traditional Māori society (Macfarlane et al., 2005). This section draws on Davis's idea that similar processes operate to *maintain the status quo* at these different levels of organisation. If implementation is to be sustainable, this systems tendency to self-correction will need to be addressed. Accordingly, implications arising from three potential implementation issues above are briefly explored at all three systems levels. This type of analysis emphasises the necessity for co-ordination of changes as the curriculum implementation proceeds. It also draws on the idea from complexity theory that rich and diverse systems inputs are the best means of supporting change, which might begin at any one of a number of (essentially unpredictable) potential trigger points (see for example Davis, Sumara, and Luce-Kapler, 2000).

Issue 1: "We already do that": Demonstration of learning as a process of adaptation or reconciliation

Key competencies integrate the former essential skills with knowledge, as well as with attitudes and values. While it is likely that some skills aspects are already specifically taught by many teachers (thinking skills for example), the *holistic* nature of the competency suggests that even these aspects of the current curriculum will need to be extended if the full intent of the key competencies is to be realised. The "we already do that" response will need to be thoughtfully addressed. Both teachers and students need to be able to see how the demands of a specific task potentially match to, then extend, current competencies, so that a process of learning as adaptation

for the new task can unfold. (This will be the case for both students and teachers as *learners*, although obviously the specifics of the learning challenge differ in each case.) Alternatively, if the new task demands something more than, or different to, existing competencies, a process of reconciliation may be needed (see Section 1). In either case, metacognitive as well as cognitive and skills aspects are implicated:

- At the micro-level students need to be provided with the resources they need to carry out authentic tasks, and to have their active learning supported by appropriate scaffolding and modelling of the appropriate aspect(s) of the key competency or competencies in focus. For their teacher this requires considered attention to opportunities to learn, as well as a willingness to model new learning, and to share power with students as they practise, extend, and reflect on their developing competencies, and increasingly, initiate self-directed learning.
- At the meso-level teachers will be challenged to discuss how the intentions of the key competencies initiative extend or challenge existing practice, both in their own classrooms and in wider school organisation and culture. Attention will need to be directed to all aspects of the school's curriculum, and to the nature of planned learning tasks, bearing in mind the challenges posed by the meaning of "authenticity" (see Section 6).
- At the macro-level the support of the wider school community will be needed. Unless the intention of the key competencies initiative is widely understood, and interested school leaders and advisers, policy makers, parents, and employers given opportunities to explore the theoretical underpinnings, it seems likely that critique from the perspective of entrenched binary assumptions could continue to undermine the intent of the initiative. More pragmatically, the challenge to foster learning through authentic tasks will likely lead to a shift in sites of learning, creating more diverse links between school and the wider community, as well as to a shift in the balance of power, affording more decision making to students and, where appropriate, to others who also support their learning.

Issue 2: "We haven't got time to do that": Developing dispositions, not just content and skills

For the curriculum change to succeed, key competencies will need to be valued as a *priority* for learning. As long as teachers think they do not have the time, or students and parents perhaps think of authentic tasks as a distraction from "proper" content learning, the change is likely to be resisted:

- At the micro-level students need to be involved in metacognitive conversations about their learning, so that they have opportunities to see the aims and benefits of increasing competence in each of the five areas. They cannot be forced to adopt the desired dispositions and will need much practice and confidence building. The same is true of individual teachers of course. They too, will need support and access to ongoing professional conversations as they change or adapt their teaching focus and practices.
- At the meso-level teachers will need to work together to challenge and extend their personal professional beliefs about teaching and learning. "Professional learning communities" are one

model for how this might happen. Conversations could be at a team or school-wide level, or even in between-school clusters as in the current Normal Schools key competencies initiative. In the case of secondary subject teaching, ongoing conversations will be needed within subject associations and across discipline areas as well. (It is interesting that the importance of this sort of cognitive challenge for effective professional learning is an emergent finding of the current BES on professional development that impacts positively on student learning.[10])

- At the macro-level ongoing curriculum development work may be needed to further reduce "content", or to model ways content can be more efficiently and effectively integrated with key competencies in specific types of tasks. Analysis of effective teaching carried out for the Social Studies BES emphasises the importance of *time* to learn and practise.[11] Informative "second tier" curriculum materials such as exemplars and case studies would make an important contribution to professional conversations about how to create that time within the existing limitations of formal schooling.

Issue 3: "If it's not assessed, we won't teach it": Aligning assessment with curriculum, pedagogy, student-centred approaches, and context

The focus of assessment is likely to be the focus of teaching, and the lens through which the wider community judges the "quality" of teachers and schools:

- At the micro-level students will need to be more fully involved in the ongoing assessment of their learning because, as noted in Section 1, some aspects of their developing competence can only be inferred by watching what they do. This has implications for the methods used to gather "evidence" of learning, and indeed for the type of evidence seen as relevant. The challenge to support more metacognitive awareness suggests more self- and peer-assessment will be important. Documenting success in meeting the diverse demands of authentic tasks may lend itself to more active student involvement in documenting and evaluating their own learning through journal keeping, building portfolios, or presenting a performance or product, with an associated analysis of ways this work has extended their individual competencies. Encouragingly, these recommendations are well aligned to many current assessment initiatives.
- At the meso-level schools and teachers will need to focus on how they use assessment information to support students' awareness of their growing competencies, and to reflect this in their planning and reporting procedures. Examples of assessments that reflect the intention of the key competencies whilst also providing for meaningful planning and reporting processes will be needed. While traditional quantitative instruments for measuring aspects of learning such as developing literacy and numeracy skills will continue to be important, the purpose for which such instruments are used should emphasise formative assessment rather than normative comparisons.

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10 As reported in preliminary findings to the PPTA conference, Wellington, April 2006.

11 As reported by Graeme Aitken to the Teachers Talk Teaching conference, Auckland, April 2006.

- At the macro-level there will need to be ongoing collective discussion of the nature of evidence of learning and, in particular, about what "progression" in developing the key competencies might look like (Hipkins et al., forthcoming). In time, the achievement standards used to assess senior secondary students' learning for their NCEA qualifications would need to evolve. Standards that currently assess content mastery reinforce "business as usual" and will need to be revisited. However, it would seem unproductive to carry out such revisions before relationships between curriculum content and the key competencies have been more widely debated. Other agencies and advisers who work with schools (for example SSS, ERO, and NZQA moderators) will need to be fully involved in ongoing assessment discussions so that schools do not receive mixed messages as they realign their planning and reporting practices. And, as for both the above issues, gaining a level of public understanding of any changes will be important for community acceptance.

In conclusion

The analysis presented in this report shows that the key competencies are potentially a richly productive, future-focused curriculum innovation. However, much depends on how they are interpreted and adopted. There are substantial challenges to the realisation of their full potential. Teachers will need carefully considered support and resources, including time for professional conversations and workable curriculum materials and examples. They cannot be expected to change their practice until they understand and "own" the compelling reasons for doing so.

The "message systems" of curriculum, pedagogy, and assessment will need to be realigned, taking account of student-centered learning needs and the wider contexts implicated in learning for the "knowledge society". For secondary schools there are indications that ongoing NCEA development will be needed in due course. Encouragingly, the key competencies already align well with many current initiatives and with the policy focus on lifelong learning and learning success for all students. The emphasis on student-centered pedagogy and support for diverse learners of the Best Evidence Syntheses is congruent with the key competencies initiative. So is the focus on formative assessment of AtoL and similar initiatives, the support for literacy development across the curriculum, and the move to make assessment goals more transparent and student-centered through the planning and reporting initiative.

Teachers will need help to see how knowledge fits into the competencies, and will need reassurance that it is still valued, even as they learn to be more critical of the "one size fits all" model of traditional curriculum content, and more accepting of diverse ways of knowing. Interested members of the wider community will need to be supported to understand the changes, both in the interests of acceptance and sustainability, and because the current clear boundaries between school and wider community activities will inevitably begin to erode. While the stakes are high, patience, power sharing, and careful planning for implementation seem advisable.

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