Thinking Skills and Creativity 7 (2012) 134–143

Contents lists available at SciVerse ScienceDirect

Thinking Skills and Creativity

journal homepage: http://www.elsevier.com/locate/tsc

Positioning thinking within national curriculum and assessment systems: Perspectives from Israel, New Zealand and Northern Ireland

Carmel Gallagher[a,*,1], Rosemary Hipkins[b,1,2], Anat Zohar[c,1,3]

[a] Queens University, 69-71 University Street, Belfast, Northern Ireland BT7 1HL, United Kingdom
[b] New Zealand Council for Educational Research (NZCER), Level 10, West Block, Education House, Wellington, New Zealand
[c] School of Education, Hebrew University, Jerusalem 91905, Israel

ARTICLE INFO

Article history:
Received 17 February 2012
Received in revised form 5 April 2012
Accepted 10 April 2012
Available online 20 April 2012

Keywords:
Teaching thinking
International comparison
Curriculum implementation
Curriculum policy
Assessment policy

ABSTRACT

Over the past decade there has been a major move to position 'thinking' (however thinking is defined and enacted) as a more explicit outcome within the curriculum of many nations, with implications for teachers' professional development, assessment, and examination requirements. This paper analyses approaches to this challenge taken by Israel, New Zealand and Northern Ireland. Each short case study considers: the political context in which the developments emerged; the ways in which thinking has been framed within the national curriculum, assessment and examination system; and the successes and challenges of the approaches taken to embedding change. Comparing and contrasting three different national systems provides important insights into the priorities, commitments and resources allocated to supporting a focus on thinking as a valued curriculum goal and outcome. In particular, it highlights the need for greater coherence between curriculum, professional development, pedagogy and assessment policies generally. Given the increasing international emphasis on the importance of developing critical thinking and problem-solving skills as a response to 21st century learning challenges, the paper reflects on what more may need to be done to leverage and sustain change.

1. Introduction

Many nations are concerned to include explicit learning goals related to critical and creative thinking and problem-solving in their educational systems, as a response to 21st century learning challenges. Improving the teaching, learning and assessment of what have come to be called '21st century skills' has also become a major priority for influential international organisations such as the Organisation for Economic Cooperation and Development (OECD, 2005) and other international consortia (e.g., Griffin, McGaw, & Care, 2012). These broader learning goals are normally framed in terms of cross-curricular or overarching goals that go beyond traditional subject specific teaching.

A number of different skills frameworks have emerged, both from the research literature (Moseley, Elliott, Gregson, & Higgins, 2005; Rychen & Salganik, 2003) and at the level of national and international agencies. Their general impetus is to go beyond the basic skills of literacy and numeracy to embrace more complex mental activities, including interpersonal and

* Corresponding author at: Queens University Graduate School of Education, 69-71 University Street, Belfast, Northern Ireland BT7 1HL, United Kingdom. Tel.: +44 7796947995; fax: +44 2890649713.
E-mail addresses: carmel.gallagher@qub.ac.uk (C. Gallagher), Rose.Hipkins@nzcer.org.nz (R. Hipkins), anat.zohar1@mail.huji.ac.il (A. Zohar).

[1] This paper represents a collaborative partnership. The order of authorship was determined alphabetically.

[2] Address: PO Box 3237, Wellington 6140, New Zealand. Tel.: +64 04 384 7939; fax: +64 04 384 7933.

[3] Tel.: +972 2 5880488.

1871-1871/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.tsc.2012.04.005

social skills, as well as cultural values. Sometimes these are described in a simple list, as in the European Commission's key competences for lifelong learning (European Commission, 2004). A more theoretically grounded approach can be seen in the OECD's DeSeCo work, which argued that

> coping with today's challenges calls for better development of individuals' abilities to tackle complex mental tasks, going well beyond the basic reproduction of accumulated knowledge. Key competencies involve a mobilisation of cognitive and practical skills, creative abilities and other psychosocial resources such as attitudes, motivation and values.
> (The DeSeCo Project, Executive Summary, 30 June, 2005)

The various frameworks differ in the extent to which they emphasise achievements in the cognitive domain, such as thinking and problem solving, manipulation of symbols, and language learning, in contrast to achievements related to the psychosocial domain, such as interpersonal skills, working with others, empathy, self-management, and participating. However, since thinking cuts across so many areas and is also highly valued in subject teaching, it is not surprising that it features strongly in all of the frameworks. The emphasis on developing higher-order forms of thinking that go beyond the mere recall of information, aims to enable students to grasp a deep understanding of what they are learning, to be more critical of evidence and arguments, to be creative and generate new knowledge, as well as to problem solve and make decisions in the face of uncertainty. While these forms of thinking have traditionally been valued in education, they have not always been systematically and explicitly pursued as curriculum goals.

Although there is a growing consensus about the need to pursue these broader learning goals, the challenge for many countries is to find effective ways to frame such skills within national curricula. The further challenge is also to support longer term continuous professional development in appropriate pedagogies and to shape major political and public shifts in mindsets to allow these approaches to be embedded in assessment and examination mechanisms.

This paper provides three accounts of efforts to embed critical and creative thinking within three very different educational contexts: one emphasising a resource-rich curricular approach; another emphasising a multi-dimensional approach involving bottom-up school development alongside assessment and examinations; and the third emphasising a more top-down strategy, focussing on professional development and changes in assessment. In comparing and contrasting the very different priorities, commitments and resources allocated in these three countries, the aim is to understand the scale and complexity of some of the issues that need to be addressed. In particular, attention is drawn to the need for coherence between curriculum, professional development, pedagogy and assessment policies, in order to leverage and sustain change (Hipkins, Cowie, Boyd, Keown, & McGee, 2011).

2. First case study: Northern Ireland

2.1. The policy context in Northern Ireland

Curriculum development at a national level has been theorised as a natural process through which nations try to come to grips with their own contexts in an effort to actively influence future society (Kunzli, in Rosenmund, 2000). Although Northern Ireland is part of the United Kingdom, educational policy is devolved to national level, as it is in Scotland and Wales. Since the enhanced devolution of power to these various countries after 1998, there has been considerable divergence in policy-making across the UK jurisdictions, in particular in relation to the curriculum, though less so in relation to assessment and examinations. Curriculum change in Scotland and Wales has tended to reflect the increased significance of national culture and identity post-devolution (Phillips, 1996; Raffe, 2005, 2007). In Northern Ireland, however, where national allegiances remain divisive, the reality of more than thirty years of sectarian violence, and more than three thousand deaths among a relatively small population, highlighted the need for the curriculum to acknowledge complex identities, and to open up pupils' narrow, culturally acquired conceptions to 'dialogue across differences' (Burtonwood, 1996, pp. 232–233). For this reason, as well as a desire to prepare young people for the challenges of the 21st century, the explicit development of critical and creative thinking skills and personal capabilities was placed at the heart of the Revised Northern Ireland Curriculum (Revised NIC). Curriculum developments were led by the Council for Curriculum, Examinations and Assessment (CCEA) which has responsibility for advising government on the curriculum and for developing guidance materials to prepare schools and teachers for curriculum changes.

2.2. Positioning thinking within the Revised Northern Ireland Curriculum (NIC)

Northern Ireland was one of the first of the UK countries to introduce a more flexible framework-style curriculum, in contrast to the highly prescribed curriculum which had preceded it. The revised curriculum became statutory for all children aged 4–14 from 2007 (Department of Education Northern Ireland, 2006). Included in it is an explicit framework for developing Thinking Skills and Personal Capabilities (CCEA, 2007a, 2007b) which sets out the nature of the skills to be included; the relationship of these skills to the traditional subject areas (and to the other cross-curricular skills of Communication, Using Maths and ICT); as well as the implications for teaching.

A distinctive feature of the framework is that it integrates a range of different types of thinking skills and learning dispositions with collaborative learning (working with others) and independent learning (self management and taking

responsibility). The framework was informed by reviews of the relevant research literature, by development work in Northern Ireland classrooms (McGuinness, Curry, Greer, Daly, & Salters, 1996, 1997; McGuinness, 1999), and by other research syntheses that identified successful approaches (Higgins et al., 2004; Higgins, Hall, Baumfield, & Moseley, 2005). The framework 'positions' thinking skills as tools to help pupils to go beyond the acquisition of knowledge in order to deepen their understanding, apply ideas, generate new possibilities, make decisions, and plan, monitor and evaluate their progress.

Because personal and interpersonal skills and capabilities underpin success in all aspects of life, it was also considered important that pupils learn to manage their own emotions, to interact effectively with others, and to regulate and enhance their own learning capacity to become autonomous and independent learners. Five strands are identified in the framework – Managing Information; Thinking, Problem-Solving and Decision-Making; Being Creative; Working with Others; and Self-Management.

An 'infusion' approach means that these skills are not isolated from the traditional areas of the curriculum but rather are developed and assessed *in and through* the subject areas, with both skills and curriculum knowledge defined as explicit learning intentions (Swartz & Parks, 1994). While acknowledging that thinking skills will be interpreted and developed differently by different subjects, the intention is to help pupils acquire a shared language for learning across the curriculum as well as the personal capabilities and meta-cognitive strategies to manage their own learning.

It was also anticipated that the explicit inclusion of thinking skills as part of the revised curriculum would require a pedagogical shift – away from traditional didactic methods of teaching towards a more interactive and dialogic pedagogy, with an focus on metacognition (McGuinness, 2005a, 2005b) and a culture of thinking in classrooms (Tishman, Perkins, & Jay, 1995).

2.3. Supporting the development of thinking skills and personal capabilities in Northern Ireland

To support the framework guidance materials were written to elaborate the meaning of the five strands in the framework and to support professional development. In addition, progression maps illustrated how the thinking skills and capabilities might progress from the Foundation Stage (early years) through Key Stage 1 (6–7 year olds), Key Stage 2 (8–11 year olds) to Key Stage 3 (11–14 year olds) (CCEA, 2007a, 2007b, 2007c). These progression grids were generic in nature and did not attempt to characterise how the skills would be embedded in subject areas. Following requests from teachers, illustrations of how progression might be characterised across 16 subject areas of the Key Stage 3 curriculum were developed (CCEA, 2009a).

Defining and setting out thinking skills in a progressive framework is a design challenge for curriculum developers. Interpreting and implementing a flexible framework across all subjects, however, is a strategic challenge on an entirely different scale, which requires teachers and schools to become much more self-directed than previously expected when the curriculum was more prescribed. To assist this process a curriculum implementation strategy provided 3–4 days professional development for all teachers on a phased basis over a number of years. This was supported by the development and dissemination of a comprehensive range of resources to promote the infusion of thinking skills and personal capabilities, including guidance and posters, and a 'Think Pack' for teachers and pupils (CCEA, 2009b), a 'Classroom Toolbox' (CCEA, 2009c), and illustrated story books for younger children, entitled 'Wise Up and Think' (CCEA, 2008).

However, support for the enhancement of thinking skills comprised just one of many strands of professional development offered as part of the curriculum implementation strategy. Other provision aimed to help teachers address other newly defined curricular requirements including personal development, employability and local and global citizenship. As a result, professional support was diversified across many fronts, with limited provision for each, although there were also opportunities for synergy across different areas of training, for example, in relation to assessment for learning. While no detailed evaluation of implementation has as yet been initiated, there is some evidence of positive engagement by many schools with the thinking skills and personal capabilities agenda. For example, some schools have appointed 'co-ordinators' for Thinking Skills and Capabilities to oversee whole-school implementation of the framework. A recent survey of 'teacher voice' found that although 80% of respondents considered the Revised NIC had increased their workload, more than 70% considered that their teaching had improved as a result (GTCNI, 2011).

2.4. Successes and challenges in Northern Ireland

Northern Ireland took an early lead within the UK in making the development of thinking skills and personal capabilities an explicit focus for the revised curriculum, including a framework conceptualising the progressions of these skills (CCEA, 2007b, 2007c). The initiative was strongly supported by a comprehensive range of guidance materials and resources for teachers and pupils and these are constantly expanded, There is evidence, though not well documented, that schools have embraced the thinking agenda and that many classrooms are more explicitly 'thought-full' than previously. Beyond that, there are many challenges to be overcome, specifically with regard to assessment.

A system is considered "coherent" when curriculum, pedagogy, assessment and other drivers and incentives are all 'aligned and reinforce one another' (Oates, 2010, p.13). There are several reasons why this alignment is not the case with regard to 'skills' assessment. Firstly, as well as introducing the Thinking Skills and Personal Capabilities framework, *separate* progression frameworks for what are called the '*cross-curricular skills*' in the legislation (Communication, Using Mathematics and ICT) were developed. The revised statutory assessment arrangements for 4–14 year olds, which are due to come into

effect from 2012 to 2013 onwards (Education Regulations, Northern Ireland, 2012), will focus primarily on the assessment of these cross-curricular skills. What are rather reductively referred to in the assessment legislation as '*the other skills*' – thinking skills and personal capabilities – are to be assessed and reported on separately by schools.

The separate progression maps for each set of skills makes it unnecessarily complex for teachers to see how the various sets of skills interact and are infused in a holistic process of learning. Because of the pressures of accountability, schools may focus mainly on the skills that have been given priority in the legislation without paying too much attention to '*the other skills*'.

Northern Ireland's examination system post-14 is also poorly aligned with the 4–14 thinking skills agenda. Because examinations syllabi are linked very strongly with those in England and Wales, no specific customisation has taken place to highlight thinking skills and personal capabilities within examination specifications post-14, other than general statements which claim that syllabi promote similar skills. It is well known that assessment can serve to reinforce curriculum intentions in powerful ways (Earl, 2003; Matters, 2006). Conversely, curricula can be impoverished by assessment against too narrow a set of measures. There appears to be little incentive within the assessment and examinations requirements for schools to maintain an explicit emphasis on the development of thinking.

This brief case study of Northern Ireland's attempts to pursue broader learning goals for the curriculum highlights the importance of aligning curriculum, pedagogy and assessment/examination policy. Despite the rhetoric about the need to develop 21st century skills, the commitment to developing assessment mechanisms and policies that might help to make this rhetoric a reality appears to lag behind curriculum commitments, across all of the UK regions.

The next two case studies illustrate how assessment and examining feature more strongly in policy agendas.

3. Second case study: New Zealand

3.1. The policy context in New Zealand

New Zealand has a long-established tradition of school self-management. Over several decades schools have come to expect to be able to make autonomous decisions about the best ways to meet the learning needs of their own students and to generally manage their own affairs (for a series of viewpoints on this policy context see Langley, 2009). In keeping with this established culture of school self-management the most recent New Zealand Curriculum (NZC) is a future-focussed framework curriculum, not dissimilar to that of Northern Ireland, whose purpose is to provide a sense of national direction for local decision-making. Each school has to work out how best to build up a detailed local curriculum based on the national framework, with the identified learning needs of its own student community demonstrably addressed. NZC was published in late 2007 and became mandatory in early 2010.

3.2. Positioning thinking as a key competency in a framework curriculum

A vision statement and a set of principles guide the reading and interpretation of the New Zealand Curriculum (NZC) framework. The vision is for students to become 'confident, connected, actively involved lifelong learners' (Ministry of Education NZ, 2007, p. 8) and the principles highlight eight areas for design critique: coherence; inclusion; cultural diversity; high expectations; a future-focus; learning to learn; community engagement; and a focus on the Treaty of Waitangi as the foundation for bicultural relationships in New Zealand. The vision and principles are given life when schools design learning programmes that weave specified learning outcomes for more traditional subject matter (the so-called 'back half' of NZC) with other front half specifications including: *values* to be 'encouraged modelled and explored' (p. 10); *key competencies*, to be developed as 'capabilities for living and lifelong learning' (p. 12) and *effective pedagogy*, which advises on 'teacher actions promoting student learning' (p. 34).

Thinking is positioned within the NZC framework as one of five key competencies adapted from those developed by the OECD's DeSeCo project (OECD, 2005). The idea is not entirely new because in the 1990s curriculum revisions, thinking was identified as one of eight essential skills (Ministry of Education NZ, 1993). Unlike the DeSeCo version, NZC does not position thinking as a 'cross-cutting' competency but rather gives it equal status with the other four key competencies: managing self; relating to others; participating and contributing; and using language, symbols and texts. Congruent with the DeSeCo intent, NZC defines key competencies as integrating knowledge and skills with attitudes and values and describes them as being the means to other valued learning ends as well as ends in themselves. In this way the NZC definition draws attention to both the dispositional and participatory aspects of competency development and signals that thinking is more than just a generic skill, and that it cannot be developed in isolation from other aspects of learning and doing.

3.3. Enacting thinking as a key competency

Planning an appropriate curriculum based on a framework that permits multiple possible combinations of the various curriculum elements is a highly complex design task. Even with the vision and principles to provide guidance, it is by no means clear how schools should proceed. The 'two halves' nature of NZC compounds the design challenge because the framework structure does not show how to integrate aspects such as key competencies (and hence thinking) with the more traditional content of the back half. Well informed leadership is critical in such a fluid context and New Zealand's Ministry

of Education has invested much of its implementation support in senior and middle managers, with the expectation that they will then proactively lead implementation processes in their schools. Leadership support has predominantly taken the form of provision of resources for high level meetings to discuss the NZC and the facilitation of network clusters for school leaders to provide mutual support and ideas; supported by the provision of web-based exemplars and suggestions. Much of this activity has focussed on the intentions of the NZC, as encapsulated in its front half. The question of what could change when key competencies, including thinking, are positioned as integral to learning within different subjects has not yet been systematically addressed via the resources provided. At the time of writing plans were afoot to address this gap.

In keeping with the culture of school self-management, New Zealand does not have a programme of national testing in its primary schools. National standards (developed post-NZC after a change of government) specify expected rates of progress in literacy and numeracy from the beginning of school up until year 8 but it is still up to schools to determine how best to assess each students' progress. At the time of writing New Zealand was in the process of redeveloping its programme of national monitoring of student achievement in years 4 and 8 (called NEMP in its earlier iteration). National monitoring involves a light-sampling approach but the developers of the assessment tasks, to be used for the first time in 2012, are well aware that their work will send signals about how key competencies might be interpreted and assessed.

The standards-based secondary school exit qualification, the National Certificate in Educational Achievement (NCEA), has a flexible, modular structure that, at least in principle, contains opportunities for local curriculum design right through to the end of schooling (Bolstad & Gilbert, 2008; Hipkins, Vaughan, with Beals, Ferral, & Gardiner, 2005). Despite this potential flexibility many secondary teachers perceive that NCEA drives the curriculum, rather than vice versa (Hipkins, 2010). The first generation of 'achievement standards' used to assess learning for NCEA conveyed a hierarchical message about the nature of thinking to be valued: 'achieving' a standard was linked to recall and description; 'achieving with merit' was linked to explanation; and 'achieving with excellence' to discussion/evaluation. Recently developed standards use different but similarly incremental and generic descriptors that need to be comprehensively exemplified to clarify the actual standard and types of thinking entailed: for example, perhaps 'apply knowledge' as evidence of achievement; 'apply it skilfully' as evidence of merit; or 'apply it effectively/comprehensively' as evidence of excellence. An accumulating body of subject-specific exemplars for these standards is one potential resource for elaboration of the difference that thinking as a key competency could make to learning, but analysis of how thinking has been infused in the assessment tasks has yet to be systematically undertaken at a national level.

3.4. Successes and challenges in New Zealand

Research to monitor the implementation of NZC has revealed considerable disparity in the understandings that schools and teachers have developed concerning what curriculum change could and should entail. Many schools with strong collegial learning cultures were ready and waiting for a framework that gave them permission to design a curriculum for the 21st century. NZC itself was developed via a highly consultative process of 'co-construction' with maximum involvement from interested school practitioners (Rutherford, 2005). These engaged leaders knew what was coming and were quick to see transformative possibilities in the new framework (Cowie et al., 2009).

Many schools led by 'early adopters' have made a strong generic connection between the key competencies, earlier professional development related to assessment for learning, and the learning-to-learn NZC principle, with associated development of strategies to promote metacognition and student reflection on their learning processes and progress (Hipkins et al., 2011). The metaphor of split screen thinking, where students are encouraged to think about the act of learning as well as its content (Claxton, 2008) has struck a chord in many of these schools and some have adopted the Effective Lifelong Learning (ELLI) approach to fostering metacognitive development (Deakin Crick, 2007).

By contrast, where the key competencies are seen as straightforward replacements for the essential skills of the previous national curriculum documents, schools are likely to regard the fostering of thinking as something they already do. In worse case scenarios they might use what curriculum theorist Alan Reid calls 'name and hope' approaches, where thinking is named as the skill to be developed in a specific unit, but then teaching carries on much as before, in the seeming hope that thinking will happen by the mere act of being named (Reid, 2006).

The recognition that key competencies in general, and thinking in particular, may need to be expressed differently in the eight learning areas has come more slowly, and in some cases not yet at all (Hipkins et al., 2011; Sinnema, 2011). More nuanced understandings of the manner in which context-specific learning opportunities act to extend competencies have typically emerged via a process of recursion in shared professional learning and actions: early surface interpretations have given way to deeper and more interwoven readings of the intent of the key competencies as the various curriculum elements have become more integrated over time (Hipkins & Boyd, 2011). However, recent exploratory research has described a 'knowing-doing gap' between the recognition that transformative subject-specific changes could result from integration of thinking and other key competencies with traditional content and actually being able to bring those changes about. Even in the leading schools, implementation progress appears to have reached a plateau. It is not yet clear whether another rapid set of changes will follow or there will be some reversion to previous practice (Cowie, Hipkins, Keown, & Boyd, 2011). With hindsight, it is clear that the complex nature of key competencies, including thinking, as agents of curriculum change is far from self evident and earlier provision of subject-specific, targeted professional learning support could have been helpful.

4. Third case study: Israel

4.1. The policy context in Israel

Like other countries, Israel has had its share of projects (initiated by academics, foundations, the Ministry of Education in Israel, etc.) that see the implementation of inquiry and higher order thinking in schools as their main goal (e.g., Dori, Tal, & Tsaushu, 2003; Schwarz, Neuman, Gil, & Ilya, 2003; Tamir, 2006; Zohar, 2004). In addition, given that entrepreneurship is a common characteristic of the Israeli culture, there are numerous grass-roots, independent schools' initiatives that foster thinking and inquiry (Office of Pedagogical Affairs, Israel Ministry of Education, 2009b). However, although many of these projects and local programmes have been quite successful, they have not succeeded in changing the bulk of teaching and learning in Israeli schools. Rather, such projects and programmes still exist as isolated pockets or 'islands' of exemplary teaching within a 'sea' of much more traditional schooling that emphasizes rote learning of facts and algorithmic problem solving.

4.2. Positioning thinking within national education policy in Israel

In January 2007 the Israeli Ministry of Education adopted a new national educational policy: "Pedagogical Horizon (PH) – Education for Thinking (Office of Pedagogical Affairs, Israel Ministry of Education, 2007; Zohar, 2008). The novelty of the Pedagogical Horizon policy lies in addressing the teaching of thinking as an explicit, major and universal educational goal; and in planning practical means for wide-scale implementation throughout the school system. The rationale for the new policy is explained by making reference to the desired characteristics of future school graduates, formulated in the following way:

> We live in an era characterised by short-lived generations of knowledge that succeed each other at a dizzying pace. In order to ensure that graduates of Israel's education system are able to successfully meet the cultural, economic, scientific and technological challenges of the 21st century, we must change our conception of what such graduates should know. One of the main goals of the education system has been, and still is, for graduates to have extensive knowledge in a variety of academic disciplines. However, our future graduates will not be able to rely on a defined body of knowledge that they have acquired at school; rather they will need higher-order thinking abilities, the ability to make judgments, and the skills for creative and critical thinking, all of which will enable them to attain new knowledge throughout their lives.
> (Office of Pedagogical Affairs, Israel Ministry of Education, 2007, p. 1).

The emphasis of the Pedagogical Horizon policy is on pedagogy rather than on content: on 'how to' rather than on 'what to' teach. The policy adopts an infusion approach to teaching Higher Order Thinking: thinking is integrated into school curricula rather than taught as an independent subject. An ideal lesson according to the policy consists of both content goals and thinking goals each of which are addressed in an explicit way. The lesson is rich in cognitively challenging questions and tasks that make intense usage of thinking strategies such as argumentation, problem solving, asking questions, comparing and contrasting, making decisions, controlling variables, drawing conclusions and identifying assumptions. The classroom learning environment fosters discourse that is rich in the 'language of thinking'. Inquiry learning is encouraged. Finally, lessons also foster metacognitive thinking.

4.3. Supporting the change process in Israel

The Israeli school system is rather centralistic and the Ministry of Education is responsible for writing curriculum documents for all school subjects. Each school subject has a National Subject Superintendent (NSS) who is responsible for all facets of learning and instruction in that subject: implementing the curriculum, writing exemplar learning materials, in-service professional development and system-wide tests. A team of instructors assist each NSS to mediate the goals of the curriculum to teachers of each specific subject. Among their other roles instructors also: visit schools and individual classrooms; explain new policies, teach new instructional strategies; and give teachers feedback concerning their classroom practice. At the end of high school students take the matriculation exams which consist of seven mandatory exams and several electives. Teachers are encouraged to participate in professional development courses by incentives that lead to increased pay. These ostensibly unrelated structural features were employed in the implementation process of the Pedagogical Horizon policy described in the following section.

Moving a whole educational system from a focus on rote learning towards a focus on higher order thinking and deep understanding cannot be brought about by mere decree, but rather must employ a detailed and carefully planned strategy. The policy stated in the Pedagogical Horizon document was to be implemented by simultaneously addressing three dimensions: curriculum, learning materials and standards; professional development; and assessment. In order to be effective, progress in these three dimensions needed to take place simultaneously in a coordinated manner (Office of Pedagogical Affairs, Israel Ministry of Education, 2009a).

First, new explicit thinking goals were introduced into curriculum documents and relevant thinking strategies for each subject were spelled out. The criteria for approving textbooks for classroom use were updated so that new textbooks would need to address thinking goals as well as content.

Second, the organisational infra-structure of subject-specific NSSs and instructors was used as an important means of disseminating the intent of the Pedagogical Horizon policy in learning, instruction and testing of all school subjects. NSSs, instructors and teachers' educators participated in a comprehensive, long-term programme of professional development designed to develop their knowledge and pedagogical strategies in the context of teaching higher order thinking. The NSS's workshop took 150 academic hours spread over three years. The emphasis on sound professional development for educational leaders was a crucial and invaluable stage in the implementation process. Those who had participated in the thinking leadership workshops eventually led professional development workshops for teachers all over the country. Some of the workshops were designed for teachers of a specific subject across many schools while other workshops were school-based so that participants were teachers of various subjects who taught in the same school. During the first five years of the Pedagogical Horizons' implementation approximately 25,000 teachers (about 20% of all teachers in Israel) went through professional development programmes of 30–60 academic hours.

The third dimension to be aligned is national assessment. In Israel there are 'MEITZAV' tests in grades 5 and 8, and matriculation exams are taken at the end of high school. All these were gradually updated. The frequency of higher order thinking test items (multiple choice as well as constructed response items) was slowly but consistently raised. For example, item analysis of the science MEITZAV tests revealed that they consisted of 10–14% higher order thinking items in 2007 and of 20% higher order thinking items in 2009. On the one hand, it was significant to begin updating the assessment early in the implementation process. Since 'testing drives instruction', it was clear that changing the assessment is a crucial incentive for changing instruction. On the other hand, the slow and gradual pace seemed necessary in order to give teachers and students time to prepare for the change.

Another example of change can be seen in the matriculation exams which introduced new options for combining state-written exams with school-based assessment centring on inquiry projects and portfolios. In addition, a variety of specific thinking programmes for various age levels were developed and offered to kindergartens, elementary schools, junior high, high schools and teachers' colleges (Ministry of Education Israel, 2008; Office of Pedagogical Affairs, Israel Ministry of Education, 2009a)

It is important to note that although many of the elements of the implementation plan had a top-down design, bottom-up elements involving entrepreneurship and free choice were also abundant. General goals and budgets were generated in a top-down procedure, but local goals and initiations, specific designs and new ideas were encouraged in a bottom-up design. The bottom-up components triggered motivation, feelings of ownership and high involvement in the process. They also facilitated the contextualization of the implementation by tailoring solutions to the specific needs of varied educational circumstances.

4.4. Israel: successes and challenges

At the time of writing this article, the Pedagogical Horizon policy has been implemented for almost five years. During this time the numerous processes described above have taken place throughout the school system. Unfortunately, a formal evaluation of these processes has not yet taken place. Nevertheless, based on a report summarising the first three years of the programme (Office of Pedagogical Affairs, Israel Ministry of Education, 2009a) as well as on scores of conversations with teachers and visits to schools, it is fairly safe to conclude that many more children are currently experiencing varied degrees of a "thinking-rich" classroom than before. Yet, although a change process has begun in a systematic way, a considerable number of additional years of careful work are necessary in order to make it deeper, more extended and sustainable.

More profound and sustainable implementation of the Pedagogical Horizons policy faces several challenges. Political changes cause frequent alterations in the educational policies embraced by the Ministry of Education. The good news is that the new Minister of Education elected in 2009 approved of the policy and kept up the implementation process. However, new goals and policies formulated since 2009 reduced the priority given to Pedagogical Horizon and the political support it had enjoyed. For example, one of the leading educational policies embraced by the new Minister of Education refers to raising test scores on national and international tests. This policy has generated intensive pressures to 'teach for the test' throughout the school system. As in other countries, the adoption of a policy emphasising high stakes testing and intense test preparation is in conflict with teaching for thinking and understanding. Ironically, even preparation for the PISA test that requires problem solving and critical thinking is conducted by a rigid 'test preparation' programme that actually hinders the deep, open-ended thinking advocated by Pedagogical Horizon.

An additional challenge results from the characteristics of the infusion approach. The Pedagogical Horizon policy calls for fostering thinking goals which are infused into the content of the school disciplines. Accomplishing this however poses a considerable professional challenge. Assuming that thinking is content-related, the nature of good thinking is not yet clear across the various curriculum subjects. In fields like science or math education there is ample research concerning issues such as the nature of classroom inquiry or the nature of argumentation. In other fields (especially in arts and the humanities) such research is not yet equally developed, leaving educators with ambiguity regarding appropriate notions of thinking (e.g., what should be the structure of inquiry projects in history or literature, or what should be considered legitimate evidence while engaging in argumentation in civics education). Despite the intensive work that has been carried out in recent years, there

are still not enough good examples of worked-out lesson plans and activities that model high-quality, authentic thinking in conceptually rich contexts. Similarly, attempts to upgrade assessment reveals the complex challenges involved in creating content-specific assessment which will assess both thinking and content goals in a valid and reliable way.

5. Reflection on the positioning of thinking within a national curriculum

Comparing and contrasting these three case studies of policy enactment provides rich food for thought. The key point of harmony is that all three systems, in their own unique way, have considered it important to foreground thinking as an explicit curriculum focus, albeit without necessarily aligning assessment and examinations provision, particularly in the case of Northern Ireland. The nature and extent of commitment support and resourcing reveals interesting differences. While Northern Ireland has focussed effort on developing and disseminating paper and web support materials, New Zealand has focussed greater effort on school leadership and change management, while Israel has focussed strongly on professional development and on engineering change in the assessment and examination system, with intense, strategic support at a level that would be envied elsewhere.

A key issue that emerges from the juxtaposition of these three accounts is the importance of systems alignment and the avoidance of mixed policy signals between curriculum direction and high-stakes summative assessments and accountability measures. Assessment policy needs to be coherent with intended curriculum change/emphasis. If the assessment policy does not facilitate a sustained focus on curriculum intentions, schools are torn in opposing directions and end up being driven by the needs of accountability and measurement as opposed to the desire to develop more engaging pedagogies.

Successful systemic change also requires consistent and stable messages over the longer term. Long-term stable messages are crucial in the case of moving from a teacher-centred to a more student-centred instruction, because this type of shift involves a radical change in teachers' beliefs about the nature of teaching and learning and requires new pedagogical knowledge (Borko & Putman, 1996; Cohen, 1988; Hand & Treagust, 1994; Prawat, 1992; Strauss & Shilony, 1994; Zohar, 2004). Switching from one policy priority to another, dressed up in different language and often heading in different directions, destroys momentum and wastes effort. Policy alignment is especially challenging given the leverage and time needed to impact on policies, particularly if they are linked to wider systems not under direct jurisdictional control, as is the case in Northern Ireland's links into English and Welsh systems. Relatively short electoral cycles and the need for incoming governments to be seen to be addressing issues in different ways from their predecessors add to these alignment challenges.

The case studies also illustrate the need for sustained support of different kinds. Readily accessible, useful and practical materials, differentiated by subject and level/key stage may be necessary but they will not be sufficient. No matter how good the materials, there are no simple paper or web 'recipes' that teachers can easily follow. Understanding, owning, and managing curriculum and assessment change, in ways that are appropriate to their specific context and pupils, is something with which the leaders and teachers in a school must individually and collectively engage. Systemic change requires a commitment to the on-going development of school leaders, not just in relation to issues of school management, but also in relation to curriculum and assessment policy development. In order to succeed, the political and administrative elements of leadership must support the pedagogical ones. Most importantly, systemic change requires a sustained commitment to the professional development of teachers, preferably in their own school settings, with on-going access to skilled facilitators who can support them in practical ways to boost their confidence and underpin their tentative forays into change (Elmore, 2004; Fullan, 2007, 2009, 2010; Levin, 2008).

Although all of the above emerged directly from the analysis of the three cases presented here, they are not unique to the context of teaching thinking. Similar observations emerge from analyses of other types of educational change processes. An additional important challenge, however, results more specifically from the nature of the complex goal to which we are aspiring, namely deep thinking embedded in rich contexts and of a type appropriate to the disciplinary demands of the relevant knowledge areas. Understanding the nature of sound and authentic disciplinary thinking in different subjects and contexts requires academic research. Translating relevant research-based knowledge into learning materials, classroom activities and sound assessment tasks – in ways that combine thinking and content coherently in all school subjects for all age groups – requires detailed and painstaking work by educators. The immense scope of this endeavour is an important component of what makes the system-wide transition to 'smart schools' (Perkins, 1992) so challenging.

References

Bolstad, R., & Gilbert, J. (2008). *Disciplining and drafting, or 21st century learning? Rethinking the New Zealand senior secondary curriculum for the future*. Wellington: New Zealand Council for Educational Research.

Borko, H., & Putman, R. T. (1996). Learning to teach. In D. C. Berliner, & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 673–708). New York: Macmillan.

Burtonwood, N. (1996). Culture, identity and the curriculum. *Educational Review*, *48*(3), 227–235.

CCEA. (2007a). *Introduction to thinking skills & personal capabilities*. Retrieved from. http://www.nicurriculum.org.uk/key_stage_3/skills_and_capabilities/thinking_skills_%20personal_capabilities/ [on-line video]

CCEA. (2007b). *Thinking skills and personal capabilities for key stages 1 & 2*. Retrieved from. http://www.nicurriculum.org.uk/docs/skills_and_capabilities/training/TSPC-Guidance-KS12.pdf

CCEA. (2007c). *Thinking skills and personal capabilities for key stage 3*. Retrieved from. http://www.nicurriculum.org.uk/docs/skills_and_capabilities/training/TSPC-Guidance-KS3.pdf

CCEA. (2008). *Wise up and think books including audio and teacher materials*. Retrieved from. http://www.nicurriculum.org.uk/key_stages_1_and_2/skills_and_capabilities/thinking_skills_%20 personal_capabilities

CCEA. (2009a). *KS3 progression maps x 16 (pdfs)*. Retrieved from. http://www.nicurriculum.org.uk/key_stage_3/skills_and_capabilities/thinking_skills_%20personal_capabilities

CCEA. (2009b). *The think pack*. Retrieved from. http://www.nicurriculum.org.uk/key_stages_1_and_2/skills_and_capabilities/thinking_skills_%20personal_capabilities/

CCEA. (2009c). *Classroom toolbox: Walking debate; thinking time; job roles, etc*. Retrieved from. http://www.nicurriculum.org.uk/key_stages_1_and_2/skills_and_capabilities/thinking_skills_%20 personal_capabilities/_skills_%20 personal_capabilities/

Claxton, G. (2008). *What's the point of school? Rediscovering the heart of education*. Oxford: One World Publications.

Cohen, D. K. (1988). Teaching practice: Plus que ca change. In P. Jackson (Ed.), *Contributing to educational change: Perspectives on research and practice* (pp. 27–84). Berkeley, CA: McCutchan.

Cowie, B., Hipkins, R., Boyd, S., Bull, A., Keown, P., McGee, C., et al. (2009). *Curriculum implementation exploratory studies: Final report*. Wellington: Ministry of Education.

Cowie, B., Hipkins, R., Keown, P., & Boyd, S. (2011). *The shape of curriculum change*. Wellington: Ministry of Education.

Deakin Crick, R. (2007). Learning how to learn: The dynamic assessment of learning power. *The Curriculum Journal*, *18*(2), 135–153.

Department of Education Northern Ireland. (2006). *The education (2006 order) (commencement no. 1) order*. Northern Ireland.

Department of Education Northern Ireland. (2012). *The education (pupil records & reporting) regulations*.

Dori, Y. J., Tal, R. T., & Tsaushu, M. (2003). Teaching biotechnology through case studies—Can we improve higher order thinking skills of non science Majors? *Science Education*, *87*, 767–793.

Earl, L. (2003). *Assessment as learning: Using classroom assessment to maximize student learning*. Thousand Oaks, CA: Corwin Press.

Elmore, R. C. (2004). *School reform from the inside out: Policy, practice and performance*. Cambridge, MA: Harvard Educational Press.

European Commission. (2004). *Implementation of 'Education and Training 2010' work programme. Key competences for lifelong learning: A European reference framework*. Brussels: European Commission.

Fullan, M. (2007). *The new meaning of educational change* (4th ed.). NY/London: Teachers College Press.

Fullan, M. (2009). Large-scale reform comes of age. *Journal of Educational Change*, *10*, 101–113.

Fullan, M. (2010). *All systems go: The change imperative for whole system reform*. Thousand Oaks/London/New Delhi/Singapore: Corwin/Sage Publications.

General Teaching Council for Northern Ireland (GTCNI). (2011). *Teachers voice 2010 executive summary*. Belfast: General Teaching Council for Northern Ireland.

Griffin, P., McGaw, B., & Care, E. (Eds.). (2012). *Assessment and teaching of 21st century skills*. New York: Springer.

Hand, B., & Treagust, D. F. (1994). Teachers' thoughts about changing to constructivist teaching/learning approaches within junior secondary science classrooms. *Journal of Education for Teaching*, *20*, 97–112.

Higgins, S., Baumfield, V., Lin, M., Moseley, D., Butterworth, M., Downey, G., et al. (2004). Thinking skills approaches to effective teaching and learning: What is the evidence for impact on learners? In *Research evidence in education library*. London: EPPI-Centre, Social Science Research Unit, Institute of Education.

Higgins, S., Hall, E., Baumfield, V., & Moseley, D. (2005). A meta-analysis of the impact of the implementation of thinking skills approaches on pupils. In *Research evidence in education library*. London: EPPI-Centre, Social Science Research Unit, Institute of Education.

Hipkins, R. (2010). *The evolving NCEA*. Wellington: New Zealand Council for Educational Research.

Hipkins, R., & Boyd, S. (2011). The recursive elaboration of key competencies as agents of curriculum change. *Curriculum Matters*, *7*, 70–86.

Hipkins, R., Cowie, B., Boyd, S., Keown, P., & McGee, C. (2011). *Curriculum implementation exploratory studies 2: Final report*. Wellington: Ministry of Education.

Hipkins, R., Vaughan, K., with Beals, F., Ferral, H., & Gardiner, B. (2005). *Shaping our futures: Meeting secondary students' learning needs in a time of evolving qualifications. Final report of the Learning Curves project*. Wellington: New Zealand Council for Educational Research.

Langley, J. (Ed.). (2009). *Tomorrow's schools 20 years on*. Wellington: Cognition Institute.

Levin, B. (2008). *How to change 5000 schools: A practical and positive approach for leading change at every level*. Cambridge, MA: Harvard Education Press.

Matters, G. (2006). *Using data to support learning in schools: Students, teachers, system*. Melbourne: Australian Council for Educational Research.

McGuinness, C., Curry, C., Greer, B., Daly, P., & Salters, M. (1996). *Final report on the ACTS project: Phase 1* (p. 80). Belfast: Northern Ireland Council for Curriculum Examination and Assessment.

McGuinness, C., Curry, C., Greer, B., Daly, P., & Salters, M. (1997). *Final report on the ACTS project: Phase 2* (p. 28). Belfast: Northern Ireland Council for Curriculum Examination and Assessment.

McGuinness, C. (1999). From thinking skills to thinking classrooms: A review and evaluation of approaches for developing pupils' thinking. *DfEE research report no. 115*. Norwich: HMSO.

McGuinness, C. (2005a). Metacognition in primary classrooms: A pro-ACTive learning effect for children. In *Paper presented at the ESRC TLRP annual conference* Warwick, 28–30 November.

McGuinness, C. (2005b). Teaching thinking: Theory and practice. *British Journal of Educational Psychology Monograph Series II Number 3 – Pedagogy – Teaching for Learning*, *1*(1), 107–112.

Ministry of Education Israel. (2008). *Renovating processes of learning, instruction and assessment in Israeli High Schools*. General Director's Regulations 69/1 [in Hebrew].

Ministry of Education NZ. (1993). *The New Zealand curriculum framework*. Wellington: Learning Media.

Ministry of Education NZ. (2007). *The New Zealand curriculum*. Wellington: Learning Media.

Moseley, D., Elliott, J., Gregson, M., & Higgins, S. (2005). Thinking skills framework for use in education and training. *British Educational Research Journal*, *31*(3), 367–390.

Oates, T. (2010). *Could do better: Using international comparisons to refine the National Curriculum in England*. Cambridge Assessment. Retrieved from http://www.cambridgeassessment.org.uk/ca/digitalAssets/188853_Could_do_better_FINAL_inc_foreword.pdf.

OECD. (2005). *The definition and selection of key competencies: Executive summary*. Paris: Organisation for Economic Cooperation and Development. Retrieved from. www.oecd.org/edu/statistics/deseco

Office of Pedagogical Affairs, Israel Ministry of Education. (2007). *Pedagogical Horizon" for learning*. Retrieved from. http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/OfekPedagogi/HinuchLechashiva/Hinoch_Le_Chashiva.htm [in Hebrew]

Office of Pedagogical Affairs, Israel Ministry of Education. (2009a). *Teaching thinking report ("Pedagogical Horizon"): 2006–2009*. Jerusalem: Israel Ministry of Education. [in Hebrew].

Office of Pedagogical Affairs, Israel Ministry of Education. (2009b). *Pearls in the system: School enterprises that promote students "thinking"*. Jerusalem: Israel Ministry of Education. [in Hebrew].

Perkins, D. (1992). *Smart schools: Better thinking and learning for every child*. New York: The Free Press.

Phillips, R. (1996). History teaching, cultural restorationism and national identity in England and Wales. *Curriculum Studies*, *4*, 385–399.

Prawat, R. S. (1992). Teachers' beliefs about teaching and learning: A constructivist perspective. *American Journal of Education*, *100*, 354–395.

Raffe, D. (2005). Devolution and divergence in education policy. In J. Adams, & K. Schmuecker (Eds.), *Devolution in practice: Public policy differences within the UK* (pp. 52–69). Newcastle: IPPR North.

Raffe, D. (2007). Learning from home international comparisons: 14–19 policy across the United Kingdom. In D. Raffe, & K. Spours (Eds.), *Policy-making and policy learning in 14–19 education*. London: Bedford Way Papers.

Reid, A. (2006). Key competencies: A new way forward or more of the same? *Curriculum Matters*, *2*, 43–62.

Rosenmund, M. (2000). Approaches to international comparative research on curricula and curriculum-making processes. *Journal of Curriculum Studies*, *32*(5), 599–606.

Rutherford, J. (2005). Key competencies in the New Zealand curriculum: Development through consultation. *Curriculum Matters*, *1*, 210–227.

Rychen, D., & Salganik, L. (Eds.). (2003). *Key competencies for a successful life and a well-functioning society*. Cambridge, MA: Hogrefe & Huber.
Schwarz, B. B., Neuman, Y., Gil, J., & Ilya, M. (2003). Construction of collective and individual knowledge in argumentative activity: An empirical study. *The Journal of the Learning Sciences*, *12*, 221–258.
Swartz, R., & Parks, S. (1994). *Infusing the teaching of critical and creative thinking into content instruction: A lesson design handbook for the elementary grades*. California: Critical Thinking Press & Software.
Sinnema, C. (2011). *Monitoring and evaluating curriculum implementation: Final evaluation report on the implementation of the New Zealand Curriculum 2008–2009*. Wellington: Ministry of Education.
Strauss, S., & Shilony, T. (1994). Teachers' models of children's minds and learning. In L. A. Hirshfeld, & S. A. Gelman (Eds.), *Mapping the mind. Domain specificity in cognition and culture* (pp. 455–473). Cambridge: Cambridge University Press.
Tamir, P. (2006). Inquiry in science education and its reflection in the Israeli biology teaching. In A. Zohar (Ed.), *Learning by inquiry: An ongoing challenge,* (pp. 15–56). Jerusalem: Magnes.
Tishman, S., Perkins, D. N., & Jay, E. (1995). *The thinking classroom: Learning and teaching a culture of thinking*. Boston, MA: Allyn & Bacon.
Zohar, A. (2004). *Higher order thinking in science classrooms: Students' thinking and teachers' professional development*. Dordrecht/Boston/London: Kluwer Academic Press.
Zohar, A. (2008). Teaching thinking on a national scale: Israel's pedagogical horizons. *Thinking Skills and Creativity*, *3*, 77–81.