

Learning to reinvent the school curriculum

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Abstract

Schools in the Curriculum Implementation Exploratory Studies (CIES) project evolved effective ways for teachers to learn together as they gave effect to *The New Zealand Curriculum*. Some common patterns were found in the ways learning networks formed within schools and evolved over time as curriculum understanding deepened and learning needs shifted. Ideas about dynamic complexity suggest specific factors to keep in mind as networks of learners are strategically shaped and guided to maximise the chances of learning “in the spaces between” the individuals involved. Awareness of what these complex learning dynamics looked like as they played out in the CIES schools could help other school leaders leverage the impact that can be gained when professionals learn as a collective.

Introduction

This paper discusses the manner in which school leaders and teachers became connected to each other via professional learning networks that were shaped and reshaped as their schools worked to understand and implement the intent of *The New Zealand Curriculum (NZC)* (Ministry of Education, 2007) over a period of time spanning at least three years. The focus is mostly on learning networks *within* each school but sometimes shifts to a broader framing of networks that connect leaders or teachers to others in the wider system beyond the school (i.e., in other schools or in universities or similar places of professional learning).

NZC is a *framework* curriculum that provides a sense of national direction for local decision making rather than specifying what must be learned (Ministry of Education, 2007). It is up to each school to work out how best to build up a coherent curriculum based on this national framework, and to do so with sufficient flexibility to appropriately meet the learning needs of all the students in the school. The professional learning and design challenges implied here are not to be underestimated. Thus any discussion of how schools have gone about implementation of *NZC* is likely to have at its heart a discussion of how they went about learning how to give effect to its intent, having first broadly established what that intent is.

The discussion of networked learning in this paper is based on observations made over a period of three years in a number of “early adopter” schools that agreed to be part of the Curriculum Implementation Exploratory Studies (CIES) research. These early adopter schools were known to

have begun exploring and giving effect to *NZC* as soon as the draft version was available. The CIES research began to track progress in a small number of case study schools soon after the final version of *NZC* was released. The final round of fieldwork took place almost three years later, revisiting half the case study schools and adding a wider range of schools via an innovative workshop process (Hipkins, Cowie, Boyd, Keown, & McGee, 2011). Some interesting patterns of changes appeared over the research time frame and it is these patterns that form the basis of the discussion in this paper.

Learning networks and ideas about dynamic complexity

Our analysis of the learning networks we observed in the CIES study was underpinned by ideas drawn from systems theory. Systems are characterised by being inherently complex but it is important to be clear about the nature of the complexity we have in mind. Peter Senge differentiates between two types of complexity. He describes interactions grounded in *detail* complexity as a sort of “stew” where the many ingredients that make a situation complex are processed using conventional management tools for forecasting, planning and analysis. Such tools assume linear relations of cause and effect, and hence predictability of outcomes (Senge, 1992, p. 71). By contrast, he describes *dynamic* complexity as having the following characteristics: relationships between cause and effect are subtle; processes put in place interact with each other; effects of interventions vary over time; all of which means that some consequences will be “nonobvious” and hence not predictable or necessarily predicted (Senge, 1992, pp. 71–72).

Senge’s thinking about dynamic complexity resonates with more recent thinking about complex systems as capable of *learning* via the interactions that take place within them. This learning need not be conscious or deliberate. Complex systems theorists assert that both living and social systems learn and evolve, from the microscopic level of cellular interactions or brain activity to large-scale ecosystems or social groups with many different parts and processes (see, for example, Capra, 2002). From this perspective, social systems such as schools or individual classes can “learn” as their various components interact and *adapt* in response to the internal and external conditions the system is experiencing at the time. The theory suggests that the learning will be *emergent* rather than able to be predetermined. It may or may not lead to desired outcomes and change may or may not happen, for a range of *unpredictable* reasons. Since our focus today is on professional learning that is likely to lead to the sorts of changes we wish to see (for example, changes that are appropriate responses to the curriculum design challenges posed by *NZC*), it will be important to keep these complex systems dynamics in mind as we consider ways to shape learning networks to make desired outcomes more likely to be achieved.

Writing about ways to organise *teaching* so that emergent, adaptive learning might be “occasioned” (the use of this term signals that success or predictability are not guaranteed), complexity theorists Dennis Sumara and Brent Davis (2006) identify five conditions that increase the likelihood that new insights will emerge in a complex network of learners:

- It is important to draw on *diversity* to access the power of collective thinking.
- While diversity of input is essential, *redundancy* also matters. There must be common ground where the people who are interacting can stand together and share the same vision.
- Control and authority must be able to be *distributed* across the group.
- Creating spaces for *interaction* is essential to the emergence of new insights and ideas.
- Somewhat paradoxically, setting a clear structure and boundaries around planned learning activities will make it more likely that the other four conditions can be met, but obviously this must be done in a manner that does not limit learning possibilities. Sumara and Davis refer to this as the establishment of *enabling constraints*.

These conditions are now briefly explored in relation to practical ways of thinking about and planning for networked learning.

Planning for diversity of inputs

When an actual or desired change demands new patterns of responses, the system must draw on available knowledge and experiences to determine what to do next. A great strength of learning collectives is that people do bring different ideas and experiences to bear on the challenges at issue. However, from the perspective of dynamic complexity, the impact of different inputs could be somewhat unpredictable and so it is important to make strategic choices.

One choice to be considered is when to rely on diversity from within the network, and when it might be necessary to look for input from outside the learning collective. Recent research has highlighted the advantages of generating *indigenous knowledge* (IK): that is, learning that emerges from *within* the collective. Such professional learning can be very effective in leading to change in the complex contexts of schools and classrooms because it takes the pressures generated by the “dailiness” of school life into account and affirms teachers’ rich funds of practical knowing (Heckman & Montera, 2009). Here the diverse ideas needed for learning are already present in the network and the challenge is to harness them. However, input from outside the school network can also be important. Heckman and Montera emphasise that the generation of IK will not, on its own, sustain change over time. They discuss the importance of having a mentor who can bring a bigger picture perspective to the collective, and who knows how to use their own knowledge to hold up a mirror that reflects new perspectives on practice back to the school professionals so that they can keep learning and moving forward together (Heckman & Montera, 2009).

National monitoring of *NZC* implementation has highlighted that all schools need external input to help *deepen* understandings of *NZC* (Sinnema, 2011). Congruent with this, the CIES study noted the impact that well-timed, relevant and voluntarily chosen external input could have (Cowie et al., 2009). However, we also suggested that the balance between external and internal input might be productively varied at different stages of an ongoing learning journey (Hipkins et al., 2011). This aspect of strategically managing input into internal school networks is explored later in the paper.

Securing common ground (redundancy)

The idea of redundancy reminds us that members of a network cannot interact meaningfully without some common ground where knowledge, experiences and/or assumptions are shared. For example, people cannot easily join in a conversation and learn from each other if they do not speak the same language. This is obvious but it is certainly not trivial. When the intended impact of change is to transform current ways of being and doing, the use and meaning of a seemingly shared language can change in ways that are at once subtle and profound. Unless members of a learning community make this shift together the potential to talk past each other will grow and some members will be at risk of becoming out of step with “how we do things now”. As we will see shortly, investing in the development of a shared language of learning and change was a common network learning activity at some point in every CIES school’s learning journey.

Distribution of learning control and authority

Figure 1¹ shows several broad types of network structures:

- Centralised networks (A) rely on input from one predominant source. Control and authority are held centrally, which suggests that such a structure is unlikely to support adaptive, emergent learning of the sort school leaders might actually be seeking to harness.
- In model C there is no differentiation between all the potential sources of control and authority, or any specific entry points from which deeper input might spread quickly through the network. Such networks rely heavily on the IK held within the network, but there are no obvious drivers of change in specific (desired) directions.
- Decentralised networks (B) have features of both A and C. Change is likely to be driven from several nodes, with learning radiating out from these to broadly distributed webs of connections.

An early finding of the CIES project was school leaders responded to NZC implementation challenges by setting up decentralised learning networks (B) in the school (Cowie et al., 2009). Different people could be in leadership (nodal) roles at different times in the overall learning journey. Although learning was distributed there was also a focused sense of direction and drive generated by delegated leaders who worked together as well as with specific teams in the school. Varying the membership of learning teams at different times further enhanced access to a diversity of viewpoints. For example, sometimes secondary teachers would work in faculty teams, and sometimes in cross-curriculum groups. Sometimes primary teachers would work in syndicate teams, sometimes in groups that crossed the levels of the school, and sometimes in teams with a common interest in a specific learning area.

¹ Sourced from <http://cb3blog.files.wordpress.com/2009/12/hypodermic-network.png>

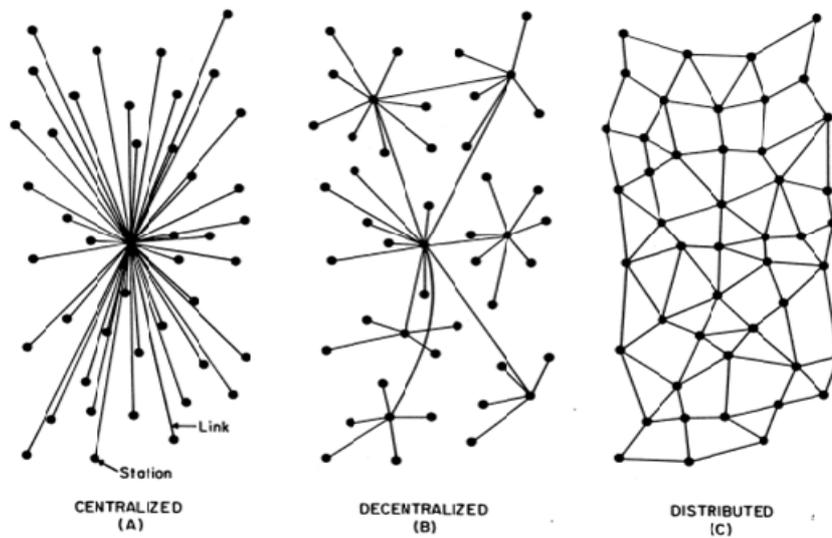


FIG. 1 – Centralized, Decentralized and Distributed Networks

In practice, network models are not as clear cut as those shown above. Combinations can occur and the network might fluctuate in its structure over time. One group of American researchers recently used a computerised social networking tool to track interactions between school principals and the administration officials of their school district over a period of three years (Daly, Moolenaar, & Carrier, 2011). In the first year, when schools were seeking to understand the intent of district-wide literacy reforms, the network of relationships was driven strongly from the centre, with some direct connections between different principals according to existing friendship groups. As knowledge of the reforms grew in the second year, the network became more decentralised: greater numbers of the school leaders became connected in multiple ways. However, by the third year the network had become even more strongly centralised than in the first year, with the central administrators once again having a “disproportionate influence” over policy implementation (Daly et al., 2011, p. 32). Interestingly, stronger district-wide literacy gains were made in the second year when the network was at its most decentralised and a coherent understanding of the reforms was built up across the whole network.

Making spaces for interactions

Learning via decentralised networks assumes that interactions will occur and, ideally, change will follow. However Senge reminds us that relationships between cause and effect can be subtle (Senge, 1992). One challenge here is that different people can take part in the same learning experiences but draw different meanings and subsequently take different courses of action. Again, this is obvious but nontrivial. Personal professional background, values and beliefs about the need for change, and previous professional experience, including tacit knowledge of practice, are all likely to impact on the learning that emerges. This was very evident in teachers’ responses to curriculum-related questions in the most recent NZCER National Survey of Secondary Schools,

where we found a “gap” between what teachers said they valued and the learning experiences they said students were actually likely to experience (Hipkins, 2010b).

Another group of American researchers recently reported on how teacher experience impacted on *knowledge flows* through school networks, with subsequent differences in levels of implementation of the intended innovation—in this case, ICT use to support learning (Frank, Zhao, Pennuel, Ellefson, & Porter, 2011). They found that relatively inexperienced teachers benefited most from more focused (i.e., centrally driven) interactions and moderately experienced teachers benefited most from decentralised interactions that supported them to explore and extend their repertoires of practice, with some direction. Highly experienced teachers gained a great deal when they could interact with equally experienced peers, refining ideas and pushing each other’s boundaries. The researchers pointed out that this was a nested set of interactions. It was not that experienced teachers did not benefit from more focused knowledge flows, because they clearly did. Their point was that the least experienced teachers were less likely to be able to benefit from more distributed, nondirected networks. Again this hardly seems surprisingly but it is a useful check to keep in mind when considering the building of fit-for-purpose network structures.

Enabling constraints

The discussion so far suggests that different network structures afford and constrain collective learning in different ways. A-type networks enable strong external input when this is seen to be needed but constrain opportunities for interaction that might allow IK to grow. “Diversity” is compromised in ways that limit the rich learning potential of the school as a collective. C-type networks enable peer-to-peer exploration which can help experienced teachers refine and strengthen innovations (Frank et al., 2011). However, Frank et al.’s research also suggests that reliance on this type of learning might constrain opportunities for less-experienced teachers, or those who know less about the innovation intended, such that gaps grow in practice between different groups in the school. “Redundancy” is compromised here and opportunities for profound new professional learning are restricted accordingly.

The challenge is to make enablers and constraints work *together* rather than in opposition to each other. It seems more likely that this can be achieved with a B-type network structure that sometimes tends towards a C-type loose-coupling for experimentation and sometimes tends to an A-type directional drive. As the following discussion will show, this variation is what we observed in the CIES schools when we considered changes over an extended period of time.

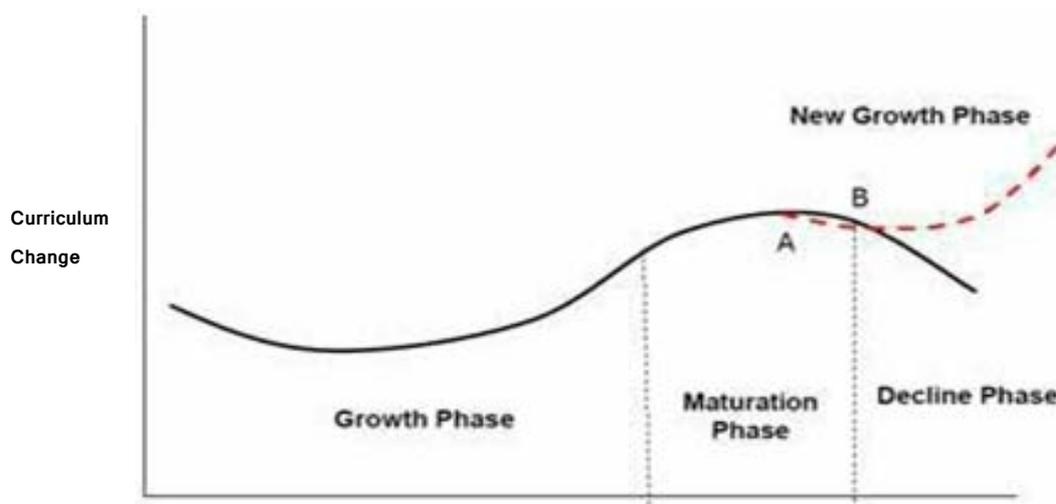
The dynamics of change over time

The analysis undertaken in the CIES project drew on the sigmoid curve as theoretical framework for exploring the manner in which the learning networks we identified evolved and shifted over time (Cowie, Hipkins, Keown, & Boyd, 2011). The idea that growth and change typically take the shape of an S-curve comes from ecology, where it is used to describe population dynamics. More

recently, Charles Handy introduced it into the social sciences (Handy, 1994) as a device for thinking about current and future change within complex systems. The model has been picked up by a number of well-known education researchers (see, for example, Fullan, 2004). The next figure shows the ideas about systems-based change conveyed of the model. Key features are:

- a growth phase when rapid change occurs
- a maturation phase when the pace of change appears to slow and perhaps stall
- a critical time (A–B) when decline will set in unless there is new input and change. With such input and change, the next growth spurt will renew the whole process.

Figure 2 Diagram of s-shaped growth curve (adapted from: www.e2consulting.co.uk)



The S curve typically begins with a “dip” during which there can be a lack of clarity about the way forward. In the CIES project this dip in the model roughly corresponded to the time of churn and questioning that preceded the appearance of the draft *NZC*, when many school leaders were juggling a range of seemingly competing professional learning imperatives, and trying to find the best way forward for their students’ learning without in the process overloading their teachers. In a small number of schools in the wider CIES study the dip had been severe—we thought of these as the “crisis turnaround” schools, where things had reached such a difficult state in the school generally that the only way was up (Hipkins et al., 2011).

Common patterns in the growth phase

Once the questions and dilemmas that characterise the dip stage have been clarified and a plan of action put into effect, rapid change is likely to occur. This is generally seen as a time of positive change and professional renewal. For the CIES schools this stage typically lasted for several years as they got to grips with *NZC* and began to give effect to its key messages. *NZC* arrived at a time when the schools were ready and waiting for the new framework and the freedoms it conferred on them to design a local curriculum (Cowie et al., 2009). We concluded that *NZC* had served to

catalyse and consolidate processes whose foundations were already in place in the early adopter schools. These included revisiting the school's vision, leadership development and establishing a learning community structure to address implementation challenges. During the growth phase, schools reworked their processes to prioritise continual review and lifelong learning.

External input to the growth phase was typically channelled via the principal and/or a small delegated leadership group. Members of these leadership teams belonged to wider professional networks beyond the school and a number were studying for educational qualifications (Cowie et al., 2009). Within the school collective, learning interactions were driven via decentralised networks as already described. The teachers learned together, in some cases also seeking student input. A shared understanding of what *NZC* might mean for their school and their learners gradually emerged and consolidated around certain “touchstones” for practice. These touchstones could be formal mission statements, visual icons and verbal mottos. They served to build “redundancy” into the professional learning networks in various ways. For example, posters in classrooms might keep a new shared language for strengthening key competencies in daily view. Or a short pithy saying such as “TAS² leading me to lead my learning” might serve to remind everyone of the overarching vision for the school as a collective and/or students as individuals—in this case the importance of involving students in making active decisions, with appropriate teacher support, about learning progress and pathways (Hipkins et al., 2011).

Another evident pattern in the growth phase was a certain amount of circling back to revisit previous decisions as new insights emerged. This was particularly the case for the key competencies. As understandings deepened, alignments to other dimensions of the school curriculum were pursued and developed; for example, synergies with the principle of “learning to learn” or with aspects of student leadership in extracurricular areas of school life (Hipkins, in press). Complexity theorists predict this pattern which they call recursive learning (Davis & Sumara, 2010). Rather than being frustrated by recursion, leaders in CIES schools recognised and accepted that uncertainty and a certain amount of unlearning and relearning came with the territory of moving the school curriculum to a 21st century framework and they mostly found the debate engaging (Cowie et al., 2009). The internal coherence of messages in the different parts of *NZC* greatly assisted recursive learning because schools could start in different places and still find themselves exploring essentially the same questions and issues (Ministry of Education, 2009).

Learning “on the plateau”

Sustainability ... is not linear. It is cyclical, for two fundamental reasons. One has to do with energy, and the other periodic plateaus, where additional time and ingenuity are required for the next adaptive breakthrough. (Fullan, 2004, p. 14)

² Taihape Area School.

The “maturation phase” in the model is a time when the pace of overt change slows down. This can be seen as a time when learning and development can “drift”, energy levels drop and complacency can set in. The time between A and B in the model is the point at which, if this complacency continues, a “decline” phase is likely to follow. Some education leaders have found this possibility a useful way to energise conversations about the necessity for curriculum change in “good” schools where teachers can be complacent that they do not need to do anything differently since their students already do well in traditional measures of learning success (see, for example, Degenhardt & Duignan, 2010).

In the final phase of CIES we came to challenge our own thinking about whether and why change might have slowed down (Cowie et al., 2011). In the third year of the project it became evident to us that the nature of the professional learning conversations had shifted, both in terms of focus and the way teachers were connected within the school’s professional learning networks. Change was certainly less overt but was nevertheless ongoing. We found it useful to reframe this as a time of “horizontal” learning. Multiliteracies theorist James Paul Gee likens horizontal learning to a time of “mucking around” getting used to the water and getting ready, eventually, to jump in and go swimming (Gee, 2004, p. 60). In this way, Gee positions this phase as essential preparation for subsequent challenging developments. In the CIES project we found that multiple layers of networks were likely to be operating within the school at this time and leadership responsibilities were likely to be distributed more widely:

This horizontal reworking entails interactive to and fro between whole-school, team and individual learning. Professional learning needs to be sustained at all three levels and to remain connected across them. This means that leaders need to be very strategic and wise and may need to step back themselves as others take up strategic leadership roles. It also requires schools to have processes in place that enable the work of different teams to be shared more widely. (Cowie et al., 2011, p. 7)

Horizontal learning entails interactive to and fro between whole-school, team and individual teacher learning, ensuring that everyone is up to speed with changes to date. Just as importantly it involves helping the school community understand the full implications of a school’s new focus and practices. Frank et al. (2011) describe it as a time to “fiddle” (i.e., experiment and explore). There are similarities to the idea that recursion is necessary to deepen *understanding* of the intent of *NZC* but here questions of change in *practice* come into the foreground. Horizontal learning typically involves consolidating on ways ideas might translate to practice, filling in gaps, reworking areas where new horizons have opened up and the school now considers they have not yet explored the full potential of this aspect of *NZC*, and looking back to align new practices with changes made during earlier explorations of *NZC* (for example, ensuring that approaches to the key competencies, vision and school versions of essence statements remain coherent) (Hipkins, in press).

Into the next cycle of change?

Adding to the challenges that schools face, Fullan (2004) notes that getting beyond the plateau might not be easy. At the point between A and B on the model, schools are likely to be confronted with “adaptive challenges” that demand a more substantive shift in aspects of practice. The whole accustomed way of “being” in the system is called into question and a dramatic change (adaptation) may be about to occur. Fullan contrasts adaptive challenges with issues that can be addressed via “technical solutions”. An important difference between the two is that the knowledge required for addressing technical problems is currently available. It might still be demanding to implement a change but much is known in relation to the problem and a way forward can at least be envisaged.

By contrast, the knowledge needed to address adaptive challenges is likely to be beyond the school’s current capacity or current way of operating to address. The internal networks do not hold the type of knowledge needed no matter how effectively the learning collective is operating (Fullan, 2004, p. 4). In the CIES report we described this dilemma as a “knowing/doing gap” (Cowie et al., 2011). One example is a tension emerging in the implementation of the key competencies. The idea of competencies as “*capabilities* for living and lifelong learning” (Ministry of Education, 2007, p. 12, emphasis added) calls into question whether they can be meaningfully developed in the learning areas without a strong focus on the *knowledge-building* practices of each discipline (Hipkins, 2010a; Reid, 2006). This is an area where teachers are likely to need resources and support from outside the school’s networks. Another adaptive challenge arises from the need to grant greater agency over their learning to the students (and the families that support them). Teachers need to involve students in curriculum decision-making processes in nontrivial ways but students also need to understand how achievement is constructed and where the authority over curriculum knowledge and assessment resides. The implied focus on learning to learn requires teachers to build new types of pedagogical content knowledge but also requires students to understand their roles and responsibilities in the learning process in new ways.

The knowledge needed to energise new input into school learning networks is likely to need further careful resource development, entailing collaboration between researchers with the necessary discipline-specific expertise and highly experienced teachers. There are resourcing implications but there are also interesting questions about how the dynamic complexity inherent in networks might best be addressed when we consider the schooling system as a whole. If we shift our focus to the very big network that would be created if all schools could be linked, each school would be one node. If we did have such a network, the overall strategy for implementing NZC suggests its overall structure would be arguably more C-like, with each school (node) essentially left to determine for itself how best to go about implementation. This is congruent with the prevailing ethos of self-determining schools but the discussion in this paper of dynamic complexity and network learning suggests we should ask at what cost that autonomy has been protected. A more B-like model for the whole system might more efficiently spread new insights and materials across the network of schools. (Established leadership networks already take this

form.) But, of course, first the necessary exemplar materials would have to be developed. From this perspective, implementation of *NZC* is still very much a work in progress.

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