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Working with complexity: Leading school networks in Aotearoa New Zealand and England

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Abstract

Inter-school networks have been promoted in many school systems globally to facilitate: knowledge generation and dissemination; responsiveness to increasingly diverse student and societal needs; and emotional and practical peer support for educational professionals. In understanding contemporary education as a 'wicked' problem, this paper explores case studies of inter-school networks in Aotearoa New Zealand (New Zealand) and England through the lens of complexity theory. We focus on how the conditions necessary for complex emergence identified by Davis and Sumara operate and how these conditions, along with their 'enabling constraints', facilitate the emergence of new perspectives and practices that enable the achievement of network objectives. This analysis indicates that where particular forms of leadership are in place, challenges – such as fragmentation, competition and the absence of social capital – can be overcome. We argue that network leaders need to balance and bridge three overlapping leadership approaches: operational leadership, entrepreneurial leadership and enabling leadership. We conclude by exploring the implications and insights for school, network and system leaders.

Keywords

Leadership, emergence, partnerships, complexity theory, networks

Introduction

Recent decades have seen increasing recognition that education operates as a complex system (Boylan, 2018; Jacobson et al., 2019; Mason, 2008; Morrison, 2002; Stacey, 2012). Complex systems can be conceptualised in terms of Rittel and Webber's (1973) typology of 'wicked' problems. Contemporary education, as a wicked problem, is an event that can neither be clearly understood nor resolved by a single actor – a single teacher, a single principal, a single school, or a single government department. Recent wicked analyses include the multi-layered causes of chronic absenteeism (Childs and Lofton, 2021), behaviour management (Armstrong, 2021), and the persistence

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of inequities and opportunity gaps in systems of education (Farley et al., 2019). Wicked problems are 'partly defined by the absence of an answer on the part of the leader … it behoves the individual leader to ask the right kind of questions to engage the collective in an attempt to come to terms with the problem' (Grint, 2010: 17–18), often with radical implications for the solutions that might be considered (Armstrong, 2021). In the face of wicked problems, policy development and implementation require connectedness, the concerted effort of multiple actors that possess some capability to act. Such circumstances have contributed to the global interest in networks as policy instruments (Kamp, 2013).

Complexity theories have a contribution to make in understanding the dynamics of networks; they focus on networks as sub-systems within systems and how these interrelate in influential ways, generating change. These systems include a range of actors: people, culture, nationality, community history, policy, funding (or lack of it), and so on. One implication is that research must move away from analysing individual entities and toward examining an ecosystem that is focussed on, and arising from, a centre of interest: a 'strange attractor' (Morrison, 2005: 324). This is not to say that complexity theories discount individual identity, subject knowledge or personal agency; 'it is not a case of collectivity *versus* individuality, but a situation of collective-possibilities-arising-in-the-mutually-specifying-activities-of-autonomous-agents' (Davis and Sumara, 2006: 58, original emphasis).

In this paper, we take up Davis and Sumara's (2008, 2006) four conditions – internal diversity, internal redundancy, neighbour interactions and decentralised control – to assess processes of emergence across networks of schools and to consider leadership implications. Emergence – also known as self-organisation or the articulation of the 'as-yet-unimagined' – is commonly regarded as the central construct of a complex system (Hager and Beckett, 2019; Jacobson et al., 2019). We also draw on Davis and Sumara's discussion of 'enabling constraints', where the focus is on the balance between randomness and coherence in complex systems. We utilise these concepts to analyse case studies of inter-school partnerships in Aotearoa New Zealand and England.

In both contexts, the government has pursued policies that encourage schools to collaborate with a view to enhancing the educational quality and/or equity (Greany and Kamp, 2022). In Aotearoa, the implementation of *Investing in Educational Success* (IES) by a centre-right National government in 2013 introduced Kāhui Ako | Communities of Learning across the country (Ministry of Education, 2014). Kāhui Ako feature funded leadership roles intended to foster and sustain collaboration, thereby mediating the damaging consequences of autonomous self-managing schools implemented under the *Tomorrow's Schools* reforms in previous decades. In England, Conservative-led governments in power since 2010 have encouraged schools to collaborate in formal and informal partnerships through its 'self-improving, school-led system' agenda (Greany and Higham, 2018), although parallel structural and accountability reforms have often made this problematic. In both contexts, then, school partnerships have emerged as a result of both hierarchical incentives/regulation and local agency, and despite the existence of parental choice mechanisms which encourage inter-school competition.

Inter-school partnerships have been studied by a number of authors, but rarely through the lens of complexity theory (Grimaldi, 2011; Hadfield and Jopling, 2012; Muijs et al., 2011). We adopt Provan and Kenis' definition of a partnership as involving three or more 'legally autonomous organisations that work together to achieve not only their own goals but also a collective goal' (Provan and Kenis, 2008: 231). Importantly, we recognise that such partnerships are not a panacea and acknowledge that networks can have a 'dark side' (Bidart et al., 2020); for example, if they reproduce unequal power relations, normalise groupthink, or are motivated by risk, fear and suspicion (Cook et al., 2007).

Key concepts in complexity theories

Given the evolving nature of the complexity field, it 'refuses tidy description and unambiguous definitions' (Davis and Sumara, 2008: 33). However, some principles can be articulated. Davis and Sumara (2006: 5) review research that suggests several qualities that enable the classification of an entity as complex. First, 'self-organisation': complex unities arise spontaneously as actions become interlinked and co-dependent. Second, 'bottom-up emergence', recognising that complex unities do not depend on central organisers. Third, 'short-range relationships': complex unities mostly communicate among close neighbours, so these immediate interdependencies are more important than top-down administration. Fourth, 'nested structure' (sometimes referred to as scale-free networks): complex unities are composed of other complex unities. Furthermore, decentralised networks, which consist of multiple nodes connecting into larger nodes, usually on several levels of organisation provide 'the architecture necessary for an intelligent system' (ibid, 88–89). Fifth and sixth, 'ambiguously bounded' and 'organisationally closed': complex unities are open in that they exchange energy with their surroundings, yet they are simultaneously closed in that they are identifiable and their behavioural patterns endure. Seventh, internally 'structure determined': complex unities can change their own structure in adapting to dynamic contexts, meaning they 'learn'. Eighth, 'far from equilibrium'. Complex unities do not operate in balance: equilibrium implies 'death'; by definition complex unities as learning systems must continue to adapt and be 'alive'. These qualities provide a foundation for the four conditions that can facilitate emergence, introduced below.

Organisations continually enact their environments in seeking a 'sustaining' closure that enables them to both maintain their own identity whilst responding to, and acting back on, their diverse environments. This reflects the structure-determined nature of a complex unity: the complex system, rather than the system context, determines how it will respond to the environment. Problems with 'the environment' can be considered as problems with the identity maintained by a given school or network at a given point in time. Thus, those charged with change management must be attentive to patterns shaping the whole organisation-environment system (Maturana and Varela, 1980); the means by which the system follows *its own* rules. In this, complexity theories address the perceived limitations of 'reductionist discourses of control' (Osberg and Biesta, 2010); within a complex system 'external authorities cannot impose, but merely condition or occasion possibilities. The system itself 'decides' what is and is not acceptable' (Davis and Sumara, 2008: 41). Thus, Stacey (2012: 127) argues that there are no tools or techniques for bringing about improvement. That said, various observers highlight the value of attentiveness to feedback loops which can influence complex systems in nonlinear ways: positive feedback typically generating growth, and negative feedback regulating and diminishing growth (Amagoh, 2016).

Methods and data

We focus on two case studies of inter-school networks. These are reasonably representative of wider network developments in England and New Zealand, though specific to their respective contexts (Greany and Kamp, 2022).[1]

Data were collected and analysed separately by each author during 2019–2020, although working in close dialogue and using parallel approaches where appropriate. Ethical approval was secured by each author separately, through our respective university panels.

The New Zealand network is the Aupaki Kāhui Ako in Christchurch, New Zealand, a collaboration of eight schools (6 primary, 1 teen parent unit and 1 secondary) and 11 early childhood

education providers. Kāhui Ako are voluntary collaborations of education providers that work together to enhance equity and excellence for students supported by government funding which is attached to a set of requirements around the focus of work – the achievement challenges negotiated with the Ministry – and the structure of the partnership. Geographically, the Aupaki primary schools are peppered around the beautiful Banks Peninsular, while the secondary school, Linwood College[2], is located closer to the inner city and has historically served a more deprived community.

In New Zealand, with the endorsement of the Regional Office of the Ministry of Education, the author invited a number of Community of Learning Leaders from the Christchurch City, Canterbury region (comprising 16 Kāhui Ako) to be interviewed for the purposes of a book on leading educational networks (Greany and Kamp, 2022). Semi-structured interviews were conducted over a period of eight months. Four further interviews were undertaken with Ministry of Education staff with specific responsibility as Lead Advisors for Kāhui Ako in the Canterbury region, with principals of schools involved in Kāhui Ako but not holding the Community of Learning Leader role, and with Across School Teachers. Throughout 2021, the author attended and observed meetings of the Canterbury Cluster Leadership Network, a facilitated network supported by the Ministry of Education involving both Kāhui Ako networks and other school partnerships. For the case Kāhui Ako – Aupaki – publicly available data on the network and its endorsed achievement challenges were accessed from the Ministry of Education website. External evaluation and research reports on the Kāhui Ako policy were also secured and used as secondary data (New Appointments National Panel, 2021, 2022). These documents report data generated in 3044 appointment or re-appointment interviews[3] with Leaders and Across School Teachers (including Aupaki), and a survey of 128 Kāhui Ako Leaders and 258 Across School Teachers undertaken during 2021.

The second case is of the Bampton[4] Alliance in England, launched in late 2020. Bampton is a small Local Authority (LA) with a population of around 250,000. The post-industrial town has high levels of deprivation, with just over a quarter of its 60,000 children and young people living in poverty. Around 45% of school-age children are from a Black, Asian or Minority Ethnic background, mainly from large Pakistani and Bangladeshi populations. Like all local areas in England today, Bampton's schooling landscape is fragmented, as a result of the expansion of nationally funded academies (the rough equivalent of charter schools in the United States) and the parallel roll-back of Local Authority (LA/district) oversight and coordination (Greany, 2020; Greany and Higham, 2018). The Bampton Alliance brings together the town's 100 primary, secondary and special schools and academies in order to address locality-wide improvement priorities.

In England, the author was commissioned by local policy makers to facilitate a 'strategy group' which shaped the new Bampton Alliance, so data were collected as part of that process. The group comprised 32 senior leaders, mostly headteachers and multi-academy trust Chief Executives (MAT CEOs)[5] with a small number of local policy makers. The group's membership was purposively selected with the aim of securing representation from all the main constituencies in terms of school types and groupings in Bampton. All 32 group members were interviewed at the start of the project, using a semi-structured interview schedule. In addition, two non-local experts who had knowledge of the school landscape in Bampton were interviewed. Over the course of the following nine months, the author co-facilitated four residential 'away days' for the strategy group, each of which involved in-depth discussions and collaborative decision-making, with the outcomes captured by the author in four detailed reports. The author also had access to a range of internal data and reports and supported a number of smaller working groups and consultation events, all of which

inform the analysis here. Finally, he interviewed four members of the strategy group a second time, in late 2020, after the launch of the new Alliance. These data were analysed to identify common themes and produce a detailed case study of networks in Bampton.

Analysis

We introduce, necessarily briefly, Davis and Sumara's (2006) conditions for complex emergence before exploring their relevance to the two case study networks. In their 2006 work, Davis and Sumara identify six conditions: internal diversity, internal redundancy, neighbour interactions, distributed control, randomness and, finally, coherence.[6] They discuss these conditions as complementary pairs. Thus, internal diversity and internal redundancy come under the heading of 'specialisation' and concern living with the tension of diversity and redundancy and avoiding the tendency to dichotomise parts and wholes (2006: 140). 'Trans-level learning' brings together neighbour interactions and decentralised control; the latter enabling the former. 'Enabling constraints' addresses the contextual factors of randomness and coherence, foregrounding recognition of the tensions of complex emergence and its location 'far from equilibrium'.

Specialization: internal diversity and internal redundancy

The first condition, *internal diversity,* refers to the representational diversity within a network as a source of innovation in responding to emergent circumstances. A 'critical point' for Davis and Sumara (2006: 137–8) is that there can be no advance specification of what sort of diversity is necessary for 'appropriately intelligent action'; rather, internal diversity 'defines the range and contours of possible responses'. This demands that diversity be both sought and maintained. However, this cannot be assumed in networks – rather, homophily is evident: people with like characteristics tend to be connected in bonded, often closed, networks characterised by strong social capital. This presents a paradox: networks function most effectively by being simultaneously highly clustered in their strong links – which provide the basis for trust, reciprocity and complementary cognition – while also benefitting from weak links (Granovetter, 1973) which help to ensure diversity and access to wider influences and resources.

On the other side of the dyad, *internal redundancy* refers to duplications and excesses that are necessary for 'complex coactivity' (Davis and Sumara 2008: 39–42); examples include common language, similar social status of members, shared responsibilities, and constancy of setting. The negative connotations of the word 'redundancy' are appropriate for descriptions of complicated systems, but not for complex unities (Davis and Sumara 2006: 138). Complex systems 'obey a logic of *adequacy'* rather than efficiency (ibid). This 'deep sameness' (ibid) enables interactions through generating invitational moments when people encounter one another, share information and generate knowledge as a social learning system (Wenger, 1998). They also compensate for system weaknesses, securing a network from failure at cut-points when one node – whether a person or group – is all that holds the network together (McCormick et al., 2011) or when one entity needs to compensate for the failings of another. A related issue is the necessity of a 'goals paradox': congruence and diversity in goals enable shared investment in co-present groups at the same time as forging synergistic advantage (Vangen and Huxham, 2012: 732).

In Aupaki, the Bays Cluster of primary schools, from which the Kāhui Ako evolved, did exhibit homophily and strong bonds generated through twelve years of cooperation. In order to access the national Kāhui Ako policy, the focus shifted to encompass shared goals for students in the broader

community, including early childhood education and secondary. This has brought socio-economic and cultural diversity into play: but the reduction in homophily is balanced by shared moral purpose and commitment to improving education for all children, as expressed in the network's agreed achievement challenges. The lead principal of the Kāhui Ako, along with the principal of Linwood College, sees diversity as offering opportunities for growth and innovation in the community as a whole. Yet this innovation through internal diversity is challenging work in a context of, for the past three decades, fully autonomous schools. Internal diversity has implications for the formation of trust. Trust is essential in contexts of risk; such a context has been sustained in New Zealand by way of competitive funding mechanisms. Trust cannot be assumed, even in contexts where schools have cooperated over sustained periods through some form of shared identity, such as geographical location or being faith-based. Where new relationships form, the development of trust requires time.

The dyad of specialisation is also evident in secondary data we reviewed for Kāhui Ako in New Zealand. Of the ten themes identified by the national New Appointments National Panel (2021: 8), three themes speak to this dyad of diversity and redundancy and the manner in which they enable complex coactivity. First, authentic partnerships; second, strengthening educationally powerful connections; third, identifying the capabilities required to lead collaborations across institutions:

> The links … have been growing and developing throughout the last four years…. A willingness from the leadership of the Kāhui Ako to engage, support and strengthen iwi [tribal] partnerships has been key. It is also a reflection of the knowledge base and capability of the local hapu [sub-tribes] to understand the nuances of the sector.' (Kāhui Ako Leader)

In the English case, it was Bampton's organisational diversity – and the associated sense that the local school landscape had become unhelpfully fragmented – that led to the decision to initiate the strategy group and subsequently launch the town-wide Alliance. Bampton's diversity is characteristic of most localities in England today. This is partly a result of the historic evolution of schooling: for example, with longstanding differences between religious and secular schools and with stratification resulting from parental choice policies. Changes that are more recent have been layered onto these historic differences, most obviously the government's push since 2010 to encourage or force schools to become academies (Greany and Higham, 2018). By 2019, when the strategy group first met, around half of all schools in Bampton had become academies. Most of these academies had joined one of the 12 MATs operating in the town, meaning that these schools were now oriented mainly towards the priorities, policies and practices of their MAT, rather than established town-wide approaches. The interviews with school and MAT leaders revealed a range of perspectives on these changes. Some valued the opportunities it had given them to work more independently, but more common were concerns around isolated schools, fears that MATs would 'take over' lower performing schools, suspicion around how strategic decisions were being made and how information was – or was not – being shared, a view that historic structures and processes were no longer fit-for-purpose, and a sense that shared improvement challenges (e.g. to attract and retain high-quality teachers to work in the town) were not being addressed in a systematic way.

The strategy group was convened to address this somewhat toxic picture. According to one local policy maker, the aim was to leave Bampton 'systemically in a better position to solve its own problems'. Interviewees acknowledged that the group was initially characterised by multiple cliques and low levels of trust, but this was seen to have shifted through the process,

such that the group was able to pivot when the pandemic hit. One interviewee described it somewhat colourfully as follows:

> When actually the shit hit the fan, rather than that group falling apart, that group decided it needed to reconvene and speak about different things – it was speaking about the safety of the staff, the safety of kids – but the relationships were there and it came together as a system and discussed it. (LA Director of Education)

Maximising the internal redundancies within the group was key to working productively with internal diversity. An early decision was taken to limit the group's membership to school and MAT leaders, thereby excluding wider groups, such as early years providers, even though, in complexity terms, incorporating these wider groups might have been seen as appropriate (i.e. to increase internal diversity). The decision to limit membership was partly pragmatic (i.e. to keep the group size manageable), but it did also increase levels of internal redundancy, since members all shared a professional language and a commitment to improving educational outcomes across the town. During early meetings significant time was spent on articulating and collectively committing to a shared vision, expressed as 'the case for change' and 'what are we trying to achieve?' statements, which put local children's learning at the heart of the endeavour, in a similar way to Aupaki's achievement challenges.

Trans-level learning – neighbour interactions and decentralised control

As the preceding sections attest, interaction is critical to the formation of partnerships. However, the neighbours involved in this interaction 'are not physical bodies or social groupings', as important as they may be. Rather, they are 'ideas, hunches, queries, and other manners of representation' which facilitate new ideas to be activated as 'potentials to action' (Davis and Sumara, 2008: 40). While this notion of the centrality of learning in collective endeavours is not new, complexity theory offers new insight into how individual and collective interests can simultaneously be achieved (Davis and Sumara, 2006: 141–3).

The other side of the trans-level learning dyad and fourth condition – *decentralised control* – focuses on leadership. The move here is away from a dominant focus on individual leaders and their actions to focus instead on 'consensual domains of authority'. Davis and Sumara (2006: 145) introduce 'shared' as a 'key notion … we use it deliberately as a synonym of decentralised'. Thus the focus is not on 'shared understanding' but more 'shared responsibility' (among other examples). The role of the named leader is thus to create possibilities for emergence to occur, often by working with a minimal profile. For Grint (2010), this is 'leadership-in-front' rather than 'leadership-in-charge'. The complexity in this dance of being 'the' leader at times, while fading into the background at others, enabling neighbour interactions in the process, is evident in our case studies. However, maintaining the right level of coherence is critical: dispersed control is not the same as everyone doing their own thing, nor is it the same as everyone doing the same thing (Davis and Sumara, 2006: 148). The network must be co-present (Vangen and Huxham, 2012): focussed on a shared process towards a shared goal, and oriented towards the relationships of the group rather than the individuals who are members of the group. This shifts attention from human capital to collective social capital.

In our New Zealand case study, positional leaders spoke of this process of using decentralised control to allow space for ideas, hunches, queries – innovation and experimentation – to flourish.

The Aupaki Kāhui Ako Leader – the second leader of this particular network[7] – indicated that his approach from the start was 'relationship focused … I just know that if you don't have it, you're not going to get anything else.' While this initially involved him in leadership-in-front with the group of principals from the network schools, that leadership had subsequently been extended to a much broader constituency including, critically in the context of bicultural New Zealand, local iwi [tribes] and hapu [sub-tribes]. With the achievement challenges of Aupaki focussed on equity of achievement, this decentralising of control of education from the Ministry to the network, and from the network to include the community, was critical. For the Aupaki Leader, the things that resonated from his own curiosity about network leadership were 'concepts of social capital' and 'guiding coalitions … I've always thought of, how do you build a team of people to guide change? Even though I may be seen as a leader, I'm not'.

For Davis and Sumara (2006), this orientation to leadership enables the other side of the dyad – the neighbour interactions which foster learning, innovation and system-level change. In New Zealand, case study leaders at both Ministry and network levels clearly articulated the necessarily experimental nature of the work they were undertaking. They were hesitant to adopt a position of confidence in how one should proceed from day to day and location to location in moving networks towards what the Ministry of Education outlined as a 'fully functioning' (Ministry of Education, 2016). In their Kāhui Ako research, the New Appointments National Panel (2022) identified four themes that appear to speak to such trans-level learning where neighbour interactions can flourish. First is an agentic model of teacher-led professional growth. Second, translating theory to practice through, for example, open to learning conversations, culturally responsive and relational pedagogies, relational trust, and professional growth cycles. Third, work to forge coherent, seamless pathways across educational sectors. Fourth, using data to improve achievement: 'sharing data leads to questions. Questions lead to discussions and discussions lead to sharing of expertise and resources. This sharing leads to change in practice' (New Appointments National Panel, 2022: 14). Such 'powerful professional conversations' – and the shared discourse and trust that enables them – are pivotal in the move from networks, to *learning* networks (Kamp, 2013)[8].

In England, the local leader who initiated the strategy group project explained that they did not have a set outcome in mind:

> I knew that the status quo wasn't tenable, so it would have to look different from what we had … I was really clear I knew what the problem was and I was really very confident that, given enough time to work this through, and sort of coach people through it, then we would get to a sensible solution … (but) I didn't have a very specific thing in my head that I did want to happen. (Opportunity Area Programme Lead)

This decentralised approach equally applied to how the project was run, allowing space for emergence to develop. For example, the original project timeline envisaged three strategy group meetings over a period of six months, but by the end of the second meeting, it was clear that more time was needed for consultation and discussion, to explore alternative possibilities and reach consensus. This was agreed on the basis that it is 'better to do something properly than quickly'.

One issue was that Bampton was perceived as too 'insular', partly because many of the leaders who worked there had never worked elsewhere, which was seen as contributing to a 'narrative of failure'. Thus, the need was for 'neighbourly interactions' with a wider set of examples and practices, to open group members' eyes to the art of the possible. This was facilitated through group member visits to eight existing local area partnerships in other parts of England, and through

various discussions with expert speakers at the away days. This injection of new ideas combined with the 'honesty' of the group discussions opened up new possibilities for collective learning, as one interviewee explained:

> I became more positive (over time) as a result of the quality of the discussions we were having, the honesty, that we were addressing the appropriate issues … So I think that the group has had a really positive impact in getting us to where we are now … For example, we are now having regular research breakfasts, looking at the evidence. We're talking about those as being the best thing that (the secondary heads group) has ever done. (MAT Chief Executive)

Enabling constraints: coherence and randomness

In their 2006 work, Davis and Sumara articulated two other conditions, one being a question of coherence, and the other randomness. These conditions are paired under the heading 'enabling constraints'. This apparent oxymoron is 'critical to the potential for complex emergence' (2006: 147) and refers to the structural conditions that determine the balance between maintaining focus, and constantly adapting. The key point here is to recognise that while complex unities are subject to imposed constraints, be they dictated by context, internal structures or whatever else, these constraints are 'not imposed rules that one must obey in order to survive, but conditions that one must avoid in order to remain viable' (ibid).

In the context of Kāhui Ako in New Zealand, this tension between maintaining focus and enabling adaptation has garnered a great deal of attention since the introduction of the networks subsequent to the IES Working Group Report (Ministry of Education, 2014). The implementation of Kāhui Ako was critiqued for its 'stifling' specifications (Kamp, 2019) and, moving forward, the intent is for less prescription to realise the potential of networks (Ministry of Education, 2019).

In Bampton, significant discussion focussed on how the new Alliance should be governed and operate to address its cross-cutting priorities. There was agreement that it should be 'school-led' and governed 'by consent', meaning that school leaders should feel a sense of ownership, not least since any costs would need to be funded from school budgets. Beyond this, there was a recognition that developing town-wide approaches with real impact would sometimes require compromise; for example, in terms of when and how schools and MATs would share their internal performance data and how any support for struggling schools would be prioritised and funded. These 'nitty gritty' discussions were key to achieving coherence and overcoming the town's fragmentation, but also generated concerns that overly bureaucratic processes could waste time or that the autonomy and distinctiveness of individual schools and MATs could be compromised.

Discussion

Looking across our two case studies and the contexts in which they developed, it is important to highlight differences as well as similarities. Many of these differences relate to the wider cultural, socio-economic, historic and contextual backdrop of each country and educational system.[9] To pick one example, policy and practice relating to Kāhui Ako in New Zealand are increasingly influenced by te Tiriti of Waitangi [the Treaty of Waitangi], the founding document signed by some 500 chiefs and representatives of the British Crown which provides a foundation for partnership and equality for indigenous Māori and those who came to New Zealand shores. Te Tiriti not only influences how policy is conceptualised and implemented in Aotearoa; it also offers a resource for collaborative

endeavours, given the priority afforded to the collective within Māori society (Rameka, 2018). We allude to one implication of this for leaders in Kāhui Ako above, where there is an expectation of engagement with local iwi [tribes] and hapu [sub-tribes]. By contrast, parents and communities rarely featured in the discussions in Bampton and it seems telling that the focus was on shaping a 'school-led' – rather than, say, a 'community-led' – alliance. At the same time, the education systems in England and New Zealand do share many similarities, not only as a result of their colonial history but also through more recent developments. For example, both countries have adopted New Public Management disciplines in recent decades, including parental choice, school autonomy and accountability (Hood, 1991).

Turning to similarities and differences at the level of the case study networks, we focus here on a few headline areas due to limitations of space. Similarities include that both Aupaki and Bampton are place-based networks which seek to draw together schools serving disparate communities into a shared endeavour, with important implications for equity and social justice. For example, in Aupaki this involves the former Bays Cluster of primary schools, serving more advantaged communities, working with Linwood College in the more disadvantaged inner city. A second similarity, which we return to in relation to leadership below, is that both networks developed in response to funding and support from hierarchical policy: neither is entirely 'bottom up' and self-organising. This is particularly important in Bampton, where the decision by local policy makers to initiate the strategy group clearly spurred and shaped the process of emergence, even if there was no pre-determined outcome for how the work might progress. In terms of differences, a key distinction relates to scale: this includes the relative size of each network (19 providers in Aupaki, 100+ in Bampton) but also the extent to which each network seeks to encompass diverse providers and multiple formal and informal sub-networks across a particular locality.

These similarities and differences clearly influence how we might draw out wider insights in relation to processes of emergence across inter-organisational networks. We focus here on three aspects which we see as particularly significant, with implications for policy, practice and/or further research in this area. First, at headline level, we suggest that Davis and Sumara's conditions allow for a more nuanced analysis and comparison of the possibilities for emergence in educational networks than would be possible using more conventional concepts and tools, for example from the school effectiveness and school improvement literatures (Creemers, 2007). This complexity analysis helps to overcome unhelpful levels of atomisation – for example at individual and/or school level – in much contemporary education research, by assessing an eco-system of change (Hager and Beckett, 2019). A second benefit of this approach, in our view, is the focus on dyads (internal diversity and internal redundancy, etc.), which helps to illuminate the 'far from equilibrium' nature of networks as they evolve, and to avoid any tendency to close down interpretations and possibilities. We highlight one example of this above, where the common trajectory of networks is towards homophily that supports trust and internal redundancy, but the parallel need for internal diversity pushes against this, towards difference and weak ties. The third strength of this approach, we argue, is the focus it brings on learning, as both a process and outcome of networking. The neighbour interactions condition is particularly important here because it foregrounds the ways in which 'ideas, hunches, queries, and other manners of representation' bump up against each other in networks to enable both exploration (innovation) and exploitation (dissemination) of knowledge and expertise. The research breakfasts in Bampton are just one example of the many we observed in the research where networking enables professionals to learn and move knowledge around, thereby facilitating educational improvement.

Considering leadership within and across emergent networks, we build here on the points made above, particularly in relation to decentralised control. We have emphasised the importance of

'shared responsibility' and the ways in which positional leaders in both localities allowed time and space for emergence to develop while actively facilitating the development of feedback loops which stimulate network development (for example, through consultations with the community in Aupaki and with other school leaders across Bampton in England). This analysis indicates that where particular forms of leadership are in place, challenges resulting from enabling constraints – fragmentation, miscommunication, competition and the absence of social capital – can be overcome. The emphasis on particular forms of leadership, and their hybrid combination (Townsend, 2015), is important: leading a single school is not necessarily good preparation for leading beyond positional authority across a network, although many of the skills and qualities involved – such as integrity, strategic thinking and the facilitation of group decision-making and commitment – will overlap (Hill, 2011). What surprised us in this research was the seemingly random distribution of network leadership capacity – it *was* present in these two cases, but this presence was not a given and we can both point to other, apparently similar, localities we have studied where no such leadership emerged and the enabling constraints were not superseded.

Interestingly, the emergence of network leadership in both our cases related, at least in part, to the role of hierarchical funding and support for network development. In both cases, this hierarchical framework spurred action and the emergence of new network forms, but also introduced requirements and constraints which sometimes hampered possibilities. For example, in the case of Aupaki, it seems unlikely that the Bays Cluster would have partnered with Linwood College or gone through the sometimes painful process of defining shared achievement challenges if these were not a requirement of Kāhui Ako funding. However, as noted, other aspects of Kāhui Ako funding were seen as 'stifling' and bureaucratic. This suggests that networks cannot entirely avoid 'reductionist discourses of control' (Osberg and Biesta, 2010), but also highlights ways in which hierarchical control and New Public Management-inspired efficiency must be tempered in order to allow space and time for networks to emerge. Linking these points and our discussion of leadership above are issues of individual and collective agency and power: our interviewees frequently reveal a self-reflexive awareness of how they needed to both 'work' the hierarchical systems within which they were situated and 'work with' the realities of markets and competition as they sought to facilitate the emergence of lateral networks. We explore these tensions and interplays in more detail elsewhere (Greany and Kamp, 2022).

Drawing these insights together, we suggest that Davis and Sumara's enabling constraints – coherence and randomness – capture the need for network leaders to balance what Uhl-Bien and Arena (Arena and Uhl-Bien, 2016; Uhl-Bien and Arena, 2018) describe as three overlapping leadership approaches: operational leadership, entrepreneurial leadership and enabling leadership. This conceptualisation recognises the need for both formal administrative structures *and* informal entrepreneurial ways of working within organisations, with complexity leadership seen as necessary to productively bridge the two approaches. While networks undoubtedly require many forms of leadership in combination, we argue that this alignment of operational, entrepreneurial and enabling helpfully captures the tight-loose nature of leadership in the hierarchically sponsored but complexly emergent networks that we studied.

Conclusion

The significance and contribution of this article rest in three main areas: its international scope, its original theoretical contribution, and its application to policy and practice. Although studies of inter-organisational networks in education have grown in recent decades (Armstrong et al., 2020; Azorín et al., 2020), including across international contexts (Révai, 2020), this remains a

relatively understudied area. Although we focus on just two countries, we show that national cultures and contexts matter and that network leadership is not always the same as a result. Turning to the article's theoretical contribution, this is based on our original application of complexity theory to assess emergence across two diverse network cases. As far as we are aware, Davis and Sumara's conditions have not been applied to inter-school networks as a response to wicked problems in this way before. Finally, considering application to policy and practice, this reflects our particular interests and stance, which means we have been keen to identify implications for leadership in the 'real' world. In particular, our observation of the random distribution of network leadership skills and qualities across localities suggests a need for policy makers to focus more closely on how such leadership can be fostered and utilised.

Finally, our attempt to explore emergence across two such diverse networks and to represent this complexity in a single article has limitations. These limitations are conceptual, methodological and representational. At the conceptual level, there is an inherent risk in seeking to place boundaries around any complex phenomenon, and in applying tools which might be seen to oversimplify and standardise its inherently adaptive and rhizomatic nature. This risk in working with complexity theories has already been rehearsed in the literature (Morrison, 2010). We have sought to ameliorate these risks by drawing on Davis and Sumara's conditions in flexible and responsive ways but accept that this will not always be successful. The methodological issues relate to our positionality as researchers, rather than to specific limitations. Researchers of complexity must always recognise their own influence on the phenomena they study, refuting expectations of scientific objectivity, but this is particularly the case in Bampton, where one author was directly involved in facilitating the emergence of the new alliance. Finally, in a similar vein, we acknowledge Davis and Sumara's (2006: 161) observation that 'in complexity terms, one cannot represent things as they are, simply because the representation contributes to the transformation of an always evolving reality'.

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Notes

1. For more detailed versions of these cases see (Greany and Kamp, 2022).
2. Linwood College will become Te Aratai College when the rebuild of the campus subsequent to the 2010/2011 earthquake concludes in 2022.
3. As acknowledged in the research reports produced by the New Appointments Panel in 2022, the research sample for the interviews – those who were seeking reappointment to their leadership roles – were likely to hold an 'optimistic perspective of the policy' (New Appointments National Panel, 2022: 5). The authors of the report argue, however, that the high number of leaders seeking reappointment, and the 'strong commonality of positive views across respondents' suggest 'most leaders believe that the Kāhui Ako model has considerable merit'. This is a position that our previous work would challenge (Greany and Kamp, 2022).
4. All names in this case study are anonymised.

5. A Multi-Academy Trust is a charitable company that has responsibility for operating multiple academies (between 2 and 50+), through a funding agreement with the Secretary of State for Education. A MAT CEO runs each trust, working to a Board. See Greany and McGinity, 2021, for details.
6. The authors note that a far longer list of conditions was, and is, subject to ongoing revision and includes conditions such as negative feedback loops, positive feedback loops, the possibility of dying, memory stability under perturbations and reproductive instability (Davis and Sumara, 2008).
7. Leader roles in Kāhui Ako are two-year appointments.
8. This shared discourse between the Ministry and practitioners evidences the evolution of the policy, in its practice. At the introduction of Kāhui Ako there had been sustained critique of the policy by educationalists, such critique being argued to have enabled such gains as have been achieved (Thrupp, 2018).
9. We explore these contextual differences in more detail in Greany and Kamp, 2022.

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