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How Networked Learning Communities Work

Volume 1 – The Report

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APORIA

Confronting an open question with an awareness both of the complexity of the issue and of the fundamental importance of pursuing a solution.

(from the Socratic Dialogues)

Acknowledgments

Over the past four years we have been fortunate to be involved in this exciting project that brought together academics, practitioners and policy makers to think about and learn about how networks of schools can work to enhance learning for all pupils. This kind of massive study could not have been done without the help of many people who worked with us and behind the scenes to bring people together, to think about important issues and to gather, organise, analyse and interpret the data that we have amassed.

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Executive Summary

This report describes the learning about the nature and impact of networked learning communities from a 3-phase study done by Aporia Consulting Ltd. of Toronto, Canada. This work has drawn on the experiences of the Networked Learning Communities Programme, with a view to informing the work of other groups and agencies in England and beyond who are incorporating networking into their educational change efforts.

The study involved creating and testing a model for the theory of action for networked learning communities – to explicate how networked learning communities are expected to work and then to test the strength of the effects within the model.

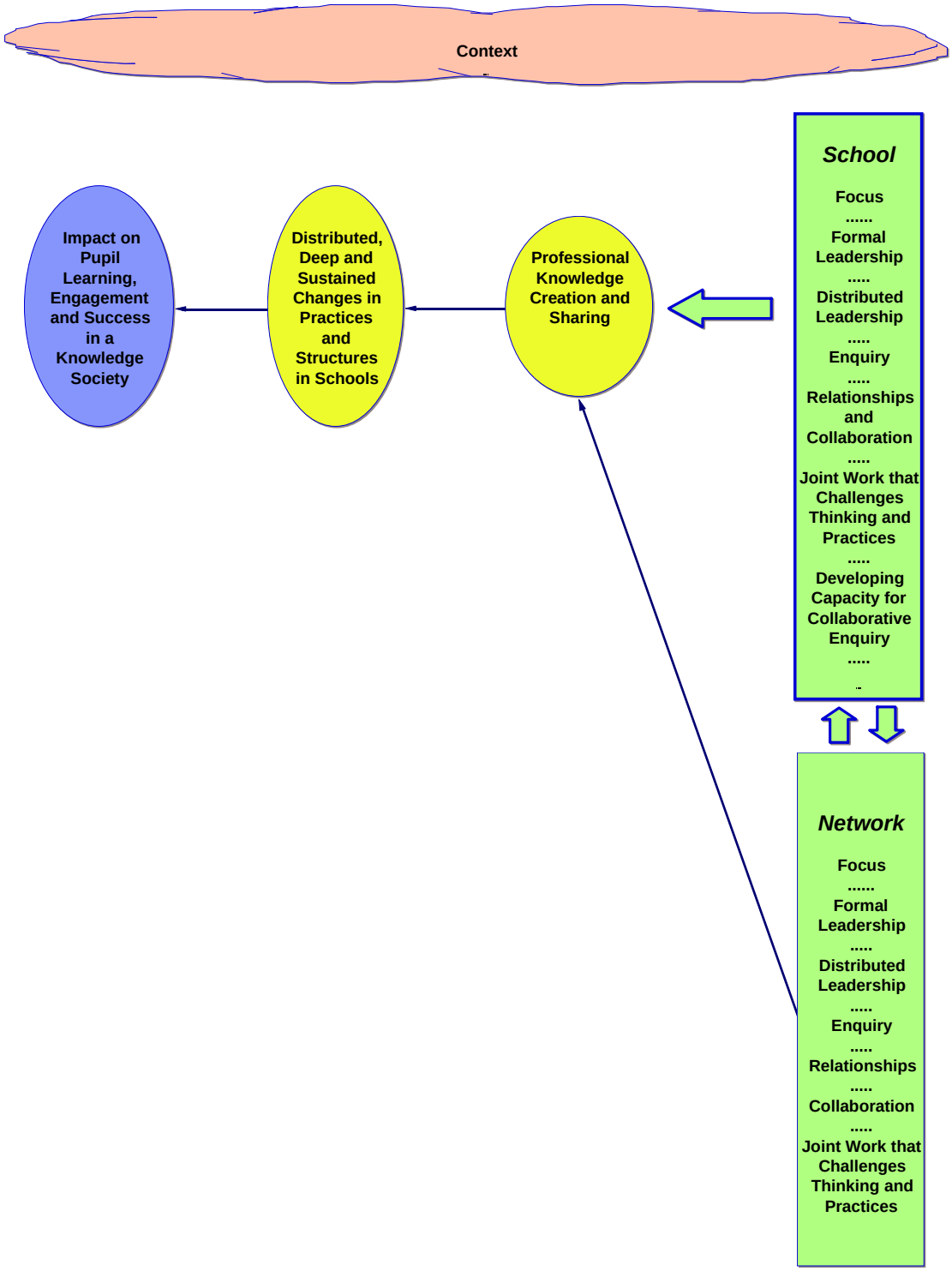
The Theory of Action

Very simply, the theory of action says that there is a logical relationship between what happens in networked learning communities and their ultimate goal of **enhanced learning for pupils**. The theory is that changes in pupil learning depend on major **changes in the practices and the structures of schools** and these changes will emerge from the **professional learning and conceptual change** that occurs through interaction within and across schools in networks. A number of features of networks and the schools within them were identified as potential enablers that are expected to create the conditions for this knowledge creation and sharing to occur in ways that are sufficiently powerful to result in significant changes in practice. Within the theory of action, these key features, which operate in both schools and networks, were **focus and purpose, relationships, collaboration, enquiry, leadership, accountability, and capacity building**.

Initial analyses of the data resulted in the refined theory of action portrayed in Figure 1, with the following school enablers: school focus, school formal leadership, distributed leadership in the school, enquiry in the school, relationships and collaboration in the school, joint work in the school that challenges thinking and practices and developing capacity for collaborative enquiry as well as the following network enablers: network focus, engagement of school formal leaders in network activities, distributed

leadership in the network, network enquiry, network relationships, network collaboration, and joint work that challenges thinking and practices in the network.

Figure 1 Refined Theory of Action for Networked Learning Communities



Learning From the Aporia Investigation

This research trilogy has produced a massive amount of data that offers considerable fodder for reflection. This section provides a summary statement about each of the key learnings from our analysis.

Networked Learning Communities are Complex

Networked learning communities are complicated and differentiated entities. The theory of action suggests that individuals are the connectors of schools to networks (and networks to schools) and that these relationships provide the link for uploading and downloading ideas, activities and interactions that can influence the way people think and act in schools. The responses to the survey questions gave a very rich picture of how the schools were operating, individually and within their networks.

The data from the survey confirmed the complexity of the way that networked learning communities work. The key features were all related to one another in a range of ways and their relationships with changes in thinking and practice and pupil outcomes were also interconnected. Nevertheless, there were some distinct patterns that help to refine the theory and suggest ways to make networks of schools more effective and more efficient in changing schools so that they serve pupils better.

Networked Learning Communities Can Influence Pupil Learning

The current study provides evidence that when networks of schools work together, there is an impact on pupil learning. The number of people in the school who are active in the network was positively correlated with pupil outcomes in English, Maths and Science at KS2 and value-added scores at KS3. The factor "overall network influence" was positively correlated with GCSE change score and the level of network attachment was related to changes in pupil outcomes in Maths and Science at KS3. Network attachment was also correlated with the intermediate outcome of changes in thinking and practice in schools. Although these associations are fairly erratic, they do suggest that there is a connection between the participation in a network and improvements in pupil attainment.

These relationships provide encouraging evidence for claims about the power of networking schools, and pave the way for deeper discussions about what these associations might mean, in terms of the rest of the theory of action.

Strength of Engagement in the Network is Important

Although networking schools can create the conditions for influencing how teachers and leaders think and act, it is not guaranteed. It is quite clear from these data that connection to the network needs to be strong and pervasive. Our evidence suggests that it is important to have extensive and strong links in order to influence changes in schools and in pupil learning. In this study, the number of colleagues involved in network activities was significantly related to pupil outcomes and to changes in thinking and practice. In addition, the strength of the associations between the network scales and changes in thinking and practice for the subgroup of teachers who were active in network activities suggests that having more staff engaged in network activities results in more changes in how they think and act.

Even though all of the schools were members of a networked learning community, it seems that many of the schools were not sufficiently engaged in the network for it to influence their daily routines or practices in ways that would make a difference for pupils. This is supported by the fact that many schools indicated that their involvement in the network did not have significant influence on the focus, leadership, collaboration, enquiry, accountability or relationships in their school, and that they felt the influence of the network on pupils was largely in improving engagement and motivation but not attainment or behaviour.

Changing Thinking and Practice is the Key

In the final analysis, nothing really changes for pupils unless there are changes in the hearts and minds of the adults in schools who work with them. Even though there is considerable evidence in this study of activity and commitment in the schools and the networks, we were surprised that fewer than half of the schools indicated that there had been changes in the areas that were included in the scale “changes in thinking and practice”. These are the kinds of changes that are essential for knowledge creation and transformation of practice in schools. Although networking schools has the potential to

create the conditions for these changes to occur, their absence suggests that the schools are not yet engaging in the kind of conceptual change, reflection and challenging of tacit knowledge that will make them knowledge creating institutions.

Schools are the Locus of Changes in Thinking and Practice

Schools indicated considerable activity in all of the enabling activities, and all of the enablers for schools were significantly related to changes in thinking and practice. This level of activity lends support to the notion that schools are the place where the daily work of change happens. Although the level of activity for each of the enablers in networks was lower than in schools, the correlations with thinking and practice were actually higher for the subgroup of colleagues who were actively engaged in network activities, supporting the conviction that there is value added for schools from being connected to the network, as these "boundary spanners" connect the work of the school to the ideas that emerge from the network.

Changes in pupil learning related to network involvement depend on ideas and processes promoted by the network penetrating into the working lives of teachers. The networked learning communities that work are likely to be ones that also link and support professional learning communities in schools so that there is a strong local locus of change for teachers, enhanced by the strength of ideas and support from the network of schools.

Relationships and Collaboration are the Beginning … Not Ends in Themselves

The findings suggest that relationships and collaboration may operate differently within schools than across schools within the network. Relationships that embody trust, shared understanding and collective responsibility appear to be more important dimensions of interaction in the network than doing things together. In the schools, comfortable relationships and working together are important for changes to happen within the school but they are all connected to one another and are likely to reflect comfortable daily working relationships that do not test the status quo. These activities in schools are a necessary but not sufficient requirement for change.

At the level of the network, however, relationships were more strongly related to changes in thinking and practice in the schools than doing things together. As will become evident in the next section, trusting relationships with shared understanding and knowledge of one another may be necessary for working and reflecting together, especially when the participants have different orientations and views and they are facing challenging issues.

Joint Work that Challenges Thinking and Practices is the Critical Core of Collaboration

An important and interesting finding in this study was the emergence of a new factor for both schools and networks that we have called "joint work that challenges thinking and practice". This factor is a qualitatively different type of collaboration than was mentioned in the previous section. It requires participants to suspend judgement, challenge their assumptions and intentionally seek out new information, in the quest for ideas and practices that work. The items that made up this scale were focussed on the kinds of interaction that are a necessary part of conceptual change and knowledge creation like, being receptive to feedback on their teaching from others, working together, talking openly with colleagues about differing views, opinions and values, and dealing openly with conflicts.

We believe that joint work that challenges thinking and practices may be at the heart of the power of networks. Networks can provide the forum for colleagues to address genuinely new, and often difficult, ideas in a safe environment, away from the risk of retribution or censure in their daily place of work. Once the ideas are more fully developed and stabilised, these colleagues can stimulate and lead the same discussions in schools, with confidence and make the ideas practical and personal so that they are more likely to be considered for action in the school.

Collaborative Enquiry is an Important New Skill

Another new factor that we have titled "developing capacity for collaborative enquiry" also emerged from the analysis. In this factor, the items are all connected to professional learning about relationships, collaboration, and enquiry, and to collectively challenging each other's assumptions.

This factor merges deep collaboration in the form of rigorous and challenging joint work with enquiry, and is consistent with Little's (2005) reference to a large body of research suggesting that conditions for improving learning and teaching are strengthened when teachers collectively question ineffective teaching routines, examine new conceptions of teaching and learning, find generative means to acknowledge and respond to difference and conflict, and engage actively in supporting one another's professional growth.

In our view, collaborative enquiry is likely to be a high leverage practice but it involves a set of skills and dispositions that are new to many schools. This new factor indicates that some participants in these networked learning communities realised that they need to acquire a critical new set of skills in order to work together on serious issues that require investigation, reflection and challenging of ideas.

The School and Network Foci Need to be Right, Shared and Understood

Schools are constantly being inundated with ideas and mandates, all purporting to offer more integrated and differentiated ways to serve pupils. Although many of these innovations have merit and they are often inextricably interconnected, schools have to negotiate their way through the multiple demands and decide where to put their energy.

A clear, high-leverage and challenging focus is an important feature of networked learning communities for bringing people together to reflect on and rethink their beliefs and their practices and to minimise the clutter of activity in the school or network. The compelling question is "Does this focus provide a space for drawing on new explicit knowledge and research as well as expose the tacit knowledge of the group for deeper consideration?" When the focus is vague or not visible, it is possible for everyone to relate to it but for no one to use it to explore what it means for changes in their thinking or their practices.

Formal Leadership Matters

Although there has been considerable attention to the role of distributed leadership in networks, a topic that we address in the next section, there is also a continuing role for formal leaders in stimulating vision and focus, providing support

(intellectual and instrumental), monitoring development, disseminating information, and buffering schools and networks from challenges posed by the larger environment.

The majority of schools indicated high involvement of formal leaders in all of the supporting activities in the school but formal school leaders were involved in activities in relation to the network in about half of the schools. It is likely that the impact of the network could be more intense if formal leaders in schools were more involved in creating the conditions for staff to be active in using the network to challenge their own thinking and practices.

Leadership is Distributed Across Schools and Networks

Spillane (2006) makes the case that leadership in schools is not connected to role or position but to activities and practices that are stretched over many people in a system of interactions that is more than the sum of the actions of individuals. Informal or distributed leadership in the schools was an important feature in this study. In a majority of the schools, colleagues were involved in the kinds of activities that Katzenmeyer & Moller (2001) describe as leading within and beyond the classroom, contributing to a community of teacher, learners and leaders, and influencing others toward improved educational practice.

Although distributed leadership has the potential to change thinking and practices and pupil learning in schools, not all schools, and certainly not all networks were utilising this resource, nor was everyone in the schools engaged in leadership activities. Distributed leadership may be a powerful lever for spreading the work of networks, but it requires developing an understanding of how distributed leadership can work within a model of rigorous and challenging joint work and collaborative enquiry to focus and deepen how teachers think about and engage in their daily work to enhance pupil learning.

Pupils and Families are Absent

Although pupils and families were not a central part of this study, the results are striking. Pupils were one of the most involved groups in the networked learning communities, with 93% of schools indicating that they were involved. However, there is

little indication that this involvement was more than superficial. In fact, very few schools said that there had been changes in either the way that they thought about pupils or their families, or changes in their relationships with pupils and families. It appears that pupils are attending network functions and showcasing their work but there is little evidence of a fundamental shift in the nature of the relationship of schools with pupils or families.

It is likely that fundamental shifts to the way schools think about the place of pupils and families in school reform and operate to serve all pupils well will involve thinking about the kinds of changes that must occur in relationships and interactions with pupils and their families to support and extend the work of schools.

It is Hard to See the Influence of Networks

Networks of schools are amorphous; they have many different forms and structures; they engage different people in different ways at different times; and they do not result in many direct products that can be attributed to their work, except the artefacts that move back and forth between the networks and the schools. This means that the work of networks of schools is almost always indirect, evidenced in changes that occur in schools and classrooms removed from the network by time and space. This makes it very hard to establish any direct links.

Even the people who are most knowledgeable about the networks don't always see their influence. This was particularly noticeable in the pattern of "don't know" responses, where respondents were uncertain about many of the items, especially in relation to the network and the limited attribution of changes to the networks. At the same time, there is evidence from this study that attachment to the network and widespread involvement in it are related to changes in thinking and practice and to pupil learning. This paradox may arise because the respondents were a number of steps removed from the work and did not understand all parts of the web of influence, so their attribution was made to their closest connection.

Networked learning communities are made up of complex interactions between structures and activities. Each of the features has a role to play, and like any complex system, the ways in which they combine and interact are innumerable and cannot be predicted in any particular context. A change in any one invites changes in the others.

Summary

Our interpretation of the results of this study are that networks of schools are likely to be most effective if enhancing pupil learning is the unwavering goal and the work of networks and the schools within them is creating the conditions for educators to engage in the kind of joint work that challenges thinking and practices and collaborative enquiry that constantly pushes them to routinely examine and alter what they do in a spiral of continuous rethinking, refinement and transformation that results in fundamental changes in the way that they think and act in schools in order to provide the best for the pupils that they serve. Relationships of trust and mutual challenge are the links; tapping explicit knowledge and exposing tacit knowledge provide the process; and leadership, both formal and distributed, can create the forums and provide the necessary support and capacity-building opportunities to move the processes forward.

Chapter 1 Introduction

In 2004-05 Aporia Consulting Ltd. of Toronto, Canada began an external study of the National College of School Leadership (NCSL) Networked Learning Communities (NLC) Programme. The NLC Programme was designed as a research and development programme to inform the broader policy audience about what works when schools intentionally work together and has focused on identifying promising features and processes and investigating the importance of these features in the success of networked learning communities. The Aporia study has evolved over three phases. Phase 1 engaged international experts in sharing existing knowledge in the field to document what is known and what deserves continued attention and consolidation. Phase 2 focused on drawing on current knowledge to construct a conceptual model of key features of networked learning communities and gathering data from a small number of schools engaged in NLCs, to exemplify the features in action. In Phase 3, we moved beyond theory to identify and clarify how networks networked learning communities work by empirically investigating the integrity of these key features, the relationships that exist among them and their relative impact on knowledge creation, changes in practice and pupil attainment.

Table 1.1 gives a short précis of what was included in each of the Phases of the investigation.

Table 1.1 Phases in the Aporia Investigation

Phase 1 – Charting the Territory	Phase 2 – Key Features Investigation[1]	Phase 3 – Links to Improvement[2]
Literature search related to networking and networked learning Interviews with key players connected to the Networked Learning Communities Commissioned papers	Identification of key features of networked learning through an extensive literature review Ongoing interaction with international experts	Creation of survey instruments based on the key features and the theory that underpins them Sample selection Data collection Statistical analysis to

[1] The full report of this study can be found on the NCSL website and a summary of the findings entitled What Makes a Network A Networked Learning Community has been published by NCSL.
[2] The details of the methodology for Phase 3 are included for the interested reader in Appendix B.

from experts in various areas[3] Mapping of existing data Seminar of international scholars[4] to talk about networks in education and discuss ways of investigating them.	Interviews with key informants in NLG and DfES and an analysis of NCSL-NLG documents Interviews in a 20 schools within NLCs to gather descriptions of the features in practice.	test the logic models

Although the three phases have occurred consecutively, they are intimately interconnected and build on one another. These studies have focussed on the Networked Learning Communities Programme, in order to learn from their experiences, with a view to inform the work of other groups and agencies in England and beyond who are incorporating networking into their educational change efforts. The theory of action that emerged from Phase 2 provides a model for thinking about how networks of schools, working together, are intended to influence changes in these schools that will have a significant impact on the learning of the pupils who attend them. The recipients of the learning from this series of projects will be those schools and educational systems that are creating and supporting networks long after the Networked Learning Communities Programme is gone, with implications for policy and practice that extend far beyond any particular programme.

This report describes the learning about the nature and impact of networked learning communities from this trilogy of studies. It has been constructed as a short summary document made up of 6 chapters, supported by a series of detailed Appendices for the interested reader. The Executive Summary includes the "high notes" from the study. Chapter 1, "Introduction" gives an overview of the project as a whole. Chapter 2 details the "Role of Networks in Education". Chapter 3 describes "How Networked Learning Communities Work: The Theory of Action". Chapter 4 gives an abbreviated picture of the process for "Testing the Theory of Action". The "Findings from Phase 3" of the study are reported in detail in Chapter 5. Finally, Chapter 6 "Pulling It all

[3] These papers have been synthesised and published by NCSL as International Perspectives on Networked Learning Communities.
[4] The names and affiliations of the participants are included in Appendix A.

Together: Learning from the Aporia Investigation" includes the important learnings from the study with some implications for policy and practice.

Chapter 2 The Role of Networks in Education

> *The world is becoming a networked environment. This is having a profound impact on the way we organise at the local, national and international level (Church et al., 2002, pg. 1)*

The educational landscape in many countries is populated by a wide variety of networks. There are multiple examples of networks of teachers, schools, and districts. Educators and educational leaders work collaboratively with a focused purpose to improve student learning and achievement (See Lieberman & Wood, 2002; Earl & Lee, 2002).

England has been a forerunner in considering networks as an integral part of their policy landscape in education. In the last few decades, education reform in England has been characterised by centrally-driven national strategies and an emphasis on school improvement. This approach was effective in boosting short-term attainment levels through a clear delineation of targets and outcome expectations and served to mobilise and focus the profession. But, as Jackson, Hannon and Cordingley (2004) explain, such "outside-in" change approaches have not worked well in the medium to long-term. Fullan (2004) suggested that moving beyond these plateaus requires "marrying the world of moral purpose and collective identity" and proposes that "by working together differently, the goal is to produce quality ideas and practices on an ongoing basis and to inspire collective effort to the extent that it becomes possible to achieve breakthroughs never before experienced".

In 2002, the English National College of School Leadership established the Networked Learning Communities (NLC) Programme as a short-term research and development programme to support the implementation of NLCs in English schools and to learn from their experiences. Networked Learning Communities were conceived as 'groups of school working together to enhance the quality of professional learning and to strengthen capacity for continuous improvement'. As Jackson and Leo (2003) describe them, NLCs are based on an image put forward by the Organisation for Economic Cooperation and Development:

> Networked Learning Communities promote the dissemination of good practice, enhance the professional development of teachers, support capacity building in schools, mediate between centralised and decentralised structures, and assist in the process of re-structuring and re-culturing educational organisational systems (OECD, 2000)

NCSL recognised that "it is hard for excellent practice to transfer, even from classroom to classroom, within a school, never mind between schools and across geographic areas" and that "fundamentally changing practices and beliefs requires deep and profound learning" (NCSL, 2002). The Programme was ambitious and forward thinking. The following quote, from a paper delivered by a co-leader of the Network Learning Group (NLG) to an International Congress of School Effectiveness and Improvement conference, gives a flavour of the NLG's conception of the nature of networked learning communities.

> *NCSL's hypotheses were that groups of schools working together had the potential to apply both practitioner knowledge and publicly available knowledge in relevant ways; that they would be able to create contextually appropriate solutions; that school-to-school networks would provide a route to greater coherence in a potentially fragmented world; and that through collaborative enquiry, data analysis and local problem-solving those involved would create expanded units of meaning and engagement – the network rather than the school. It was also a belief that teachers would feel more motivated through collaborative working; that they would feel more in control; that leadership opportunities would expand. It was anticipated that children and adults would learn more effectively. It was expected that organisational changes would occur which would generate different kinds of learning opportunities, both within and between schools, and that new teaching strategies would result. There was confidence that knowledge transfer would be enhanced, and that data analysis processes would lead to a focus upon impact (Jackson, 2005).*

The NLC view of the role of networks in changing schools was based on knowledge creation theories of learning like those reflected in David Hargreaves' (1998) vision of a "knowledge-creating" school. He argued that answering the challenges of the knowledge society requires that teachers and heads make an intentional effort to make professional experiences visible and translate them into shareable knowledge within and between schools in order to create new professional knowledge. Hargreaves goes on, in Working Laterally (2003), to describe the demands of knowledge creation in terms of innovation. Young people need to be innovative to succeed in work and life, and

education is an institution that can both model this requirement and also support its development. Innovation, for teachers, is about new professional learning about their work that is useful in their practice and allows them to do things differently and better.

This study is focussed on what could be learned from the NLC Programme to inform future policy and practice, especially since the Networked Learning Communities Programme is only one networking initiative in England. Others include Education Action Zones, Excellence in Cities, Leading Edge Partnership Programmes, and Specialist Schools. The Primary Strategy has recently included a statement that every primary school should have the opportunity to be a member of a network by 2008.

Chapter 3 How Networked Learning Communities Work: The Theory Of Action

Theory of Action *- "Using a synthesis of both stakeholder program logic and social science theory to define what a program does, in what manner, and how much of an effect each goal and objective can have on the outcome" (Bledsoe & Graham, 2005 p.307)*

Networked learning communities are seen as a powerful mechanism for stimulating and realising change and innovation (Allen & Cherrey, 2000). Judith Chapman and David Aspin (2004) suggest the following possible ways in which networks can promote change:

- Networks offer a means of assisting in the policy implementation process by linking policy both horizontally and vertically
- Networks provide a process for cultural and attitudinal change, embedding reform in the interactions, actions and behaviour of a range of stakeholders
- Networks provide for an opportunity for shared and dispersed leadership and responsibility, drawing on resources in the community beyond education
- Networks can be capacity building insofar as they are able to produce new knowledge and mutual learnings that can then feed back and inform public policy
- Networks can move attention away from a preoccupation with micro-level change at the individual site and function at the meso-level to strengthen interconnections and spread innovation across all levels – micro, meso and macro.

Supporting innovation requires both the actions of individual agents and social organisation and interaction (Hakkarainen et al., 2004) and networks have the potential to capture the complex and reciprocal relationship between individual and collective and mediate between the personal and social worlds by "… feeding the creative co-production of new knowledge that is the source of better professional practice and renewed professional pride" (Hargreaves, 2003, pg. 4).

Despite the considerable theoretical promise of networks, and their increasing prevalence and popularity as an organisational form, **there is little systematic research about the way that networks work in educational contexts or about what to emphasise to foster successful and productive networked learning in education** (Hwang et al. 2004).

In this series of studies, we have developed and tested a theory of action for networked learning communities, with a view to informing the field about the key features of networked learning communities and how these features work in practice.

In Phase 2 of this research we developed a theory of action for networked learning communities based on an extensive review of the literature, an analysis of NLC Programme documents and interviews in 20 NLC schools. The theory of action represented in the following figure models the way in which networked learning communities are expected to operate in supporting the ultimate outcomes for pupils.

Very simply, the initial theory of action says that there is a logical relationship between what happens in networked learning communities and their ultimate goal of **enhanced learning for pupils**. The theory is that significant changes in pupil learning depend on major **changes in the practices and the structures of schools** and these changes will emerge from the **professional learning** that occurs through interaction within and across schools in networks.

The schematic in Figure 1.1 begins with the end in mind to show that the intent of engaging in networked learning communities is to enhance pupil learning and success. Changing pupil outcomes depends on changes in practices and structures in schools. The influence of networked learning is based on knowledge creation theory – that learning and the creation of new knowledge by teachers and headteachers that leads to deep conceptual changes and new ways of working in schools and classrooms. The key features of schools and networks that emerged from the literature - **focus and purpose, relationships, collaboration, enquiry, leadership, accountability, and capacity building and support** are enablers that are expected to create the conditions for this knowledge creation and sharing to occur, in ways that are sufficiently powerful to result in significant changes in practice.

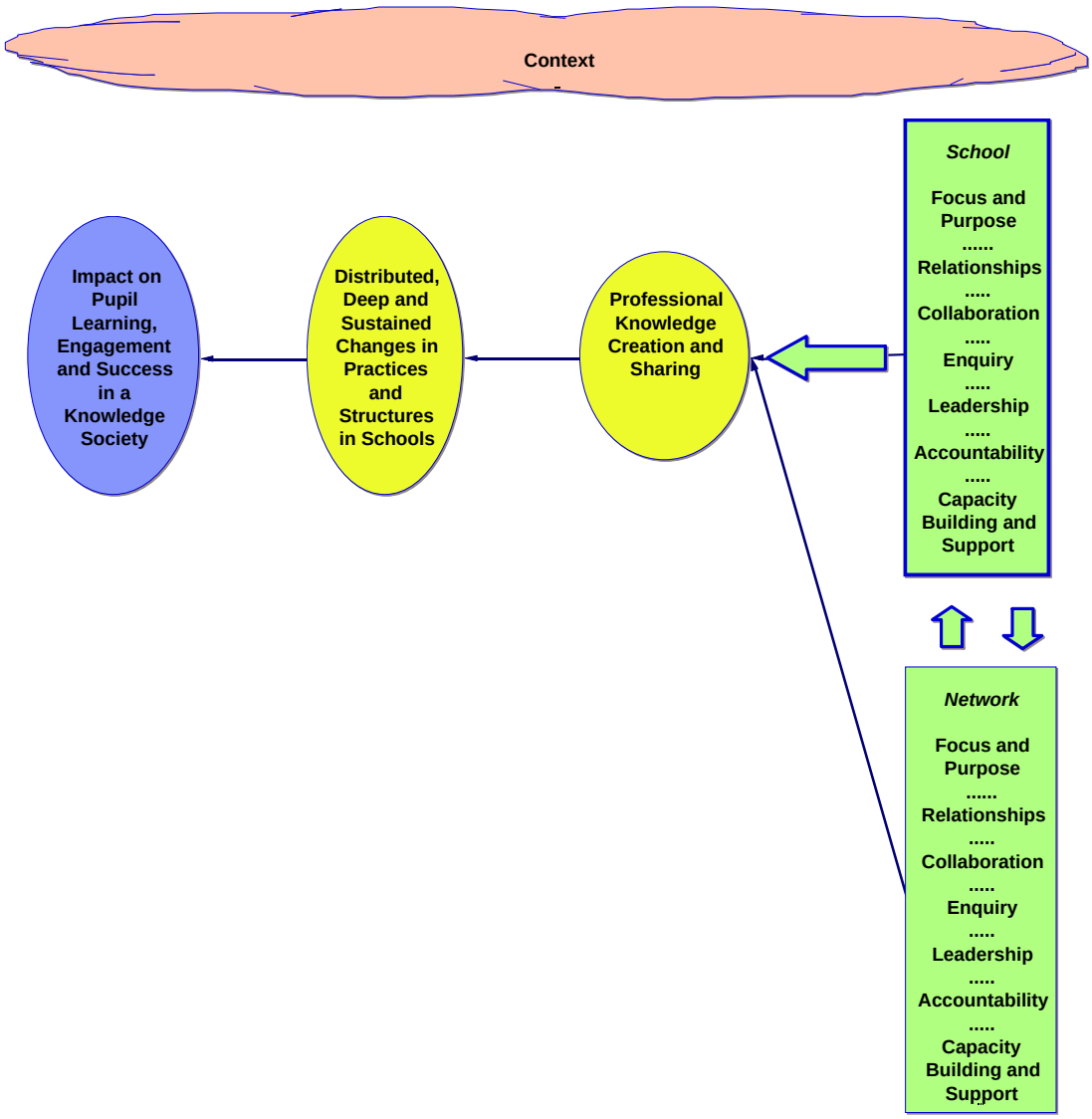


Figure 1.1 Theory of Action for Networked Learning Communities

Networked Communities for Learning

According to this theory of action, networked learning communities are fundamentally about learning - learning for pupils, as well as learning for teachers, learning for leaders and learning for schools. This is what distinguishes networked learning communities from other networks. Networks can exist for many reasons; in networked learning communities the emphasis is on learning.

Historically, the route to understanding (and supporting) learning has focused on what individuals do “in their head”. More recently, learning theory has added the notion that knowledge creation is a process of participation in various cultural practices and

shared learning activities, as well as a process of individual knowledge formation – "individual in social action". Knowledge is created through dialogue or conversations that make presuppositions, ideas, beliefs and feelings explicit and available for exploration. It is in these conversations that new ideas, tools, and practices are created, and the initial knowledge is either substantially enriched or transformed during the process (Hakkarainen et al., 2004). Innovative solutions arise when people in networked learning communities draw on outside explicit knowledge and combine it with tacit knowledge in response to authentic problems (Nonaka & Takeuchi, 1995; Von Krogh, Ichijo & Nonaka, 2000). As David Hargreaves (1998) argues, the challenges of the knowledge society require teachers and heads to become creators of professional knowledge. This means an intentional effort to articulate professional experiences into shareable knowledge within and between schools. If teachers are going to help pupils to develop the skills and competencies of knowledge creation, teachers need experience in building professional knowledge.

Changes in Thinking and Practice: Schools at the Centre

The theory of action suggests that networked learning communities work by creating the conditions for teachers, headteachers and others in schools to move outside their typical contexts to engage with a broader scope of ideas and possibilities. Networked learning communities are intended to "ratchet up" the effect of schooling on pupils learning. Once new knowledge is created and shared, the expectation is that the new learning will ***influence practices***. But, simply changing structures is not enough to change (improve) practice (Wohlstetter & Smith, 2000; Elmore, 2002). Our theory of action suggests that the ultimate point of action is the school, where teachers engage with one another in ways that challenge their thinking and move them to make deep changes in their practices. Engaging in networked learning communities is intended to foster the development of learning communities in schools by linking school-based groups to their counterparts in other schools and by facilitating the action of key enablers of learning communities for knowledge creation and sharing. When the strength of attachment between schools and networks is strong, school-level learning communities can **upload** their ideas and practices into the network – thus strengthening the networked learning

community. In the same way, school learning communities can **download** and use ideas and practices from the network for local knowledge creation and sharing. Individuals are the connectors of schools to networks (and networks to schools), through active participation and through the construction of artefacts that serve as the link between the network and the school, with a two-way flow.

Key Enablers of Successful Networked Learning Communities[5]

In our theory of action, there are seven key features that enable successful networked learning communities, each of which operates within the schools and the network: **purpose and focus, relationships, collaboration, enquiry, leadership, accountability and capacity building and support**.

Purpose and Focus

Stoll (2004) suggests that having a fundamental and clear organisational purpose is critical to the success of professional learning communities and of networked learning communities. In a general sense, successful educational change is driven by a pervasive commitment to improving education for all that includes raising the bar and closing the gap of pupil achievement, treating people with respect, improving the environment for learning and changing the context for learning at all levels (Fullan, 2004).

In addition a learning focus is likely to have a more direct impact if it is *focussed* in ways that are concrete and useful (Timperley & Robinson, 2003), high leverage in fostering pupil learning (Marzano et al., 2001); compelling, challenging and shared (Lieberman & Grolnick, 1996; Bryk et al. 1999; Firestone & Pennell, 1997); and appropriate to the context (Marzano et al., 2001). A compelling and high leverage learning focus is based on evidence that it can have significant impact on teaching practices and pupil learning. A challenging focus is one that requires teachers to reconceptualise, unlearn or make changes to existing practice and structures, legitimating the change process, making the status quo more difficult to protect and offering opportunities for joint attention to issues that are larger than any one school could address

[5] The Phase 2 report contains detailed literature reviews related to each of these key enablers.

alone (Timperley, 2004). Finally, the learning focus should be "right" for the participating schools, given their particular context, history and needs.

Relationships

Relationships form the threads or the 'connective tissue' of networked learning communities (Allen & Cherrey, 2000; Church et al., 2002) and provide the social capital that allows people to work together over time and exceed what any of them could accomplish alone (West-Burnham & Otero, 2004).. On one hand, relationships allow a network to knit together (Church et al., 2002). On the other hand, the network provides the mechanisms to support the relationships.

Relationships create a common language and a sense of shared responsibility, provide channels for communicating and disseminating information to one another about network members' expertise, and develop readiness to trust one another (West-Burnham & Otero, 2004).

Trust is a key condition of productive relationships. Indeed, Bryk and colleagues (1999) found that social trust among members of staff was considerably the strongest facilitator of professional community. They propose that a base level of such trust may be necessary for a professional community to emerge, but working and reflecting together can build trust and strengthen relationships. In relationships, conflict is inevitable –and, as we will see, valuable - but robust and trusting relationships amongst network members can allow them to work together even when they have different orientations and views (Lieberman and Grolnick, 1996).

Collaboration

Collaboration encompasses much more than relationships. It is intensive interaction that engages educators in opening up their beliefs and practices to investigation and debate. In the model put forward by Church et al. (2002), interactions among network members are characterised as "threads and knots". The threads represent the relationships; the knots represent the *activities*, the structures and content of collaboration. The knots of collaboration are the vehicles through which schools and networks conduct the work of improvement. When colleagues engage in a dynamic

process of interpretation and evaluation of practice they enhance their own practice and that of the profession. This kind of collaboration allows people to address tough problems of teaching (Firestone & Pennell, 1997), build commitment through group understanding (Crandall et al., 1986; Lieberman & Grolnick, 1996), solve issues of mutual concern (Wohlstetter & Smith, 2000) and spread innovations beyond individuals and single sites (Smith & Wohlstetter, 2001).

Judith Warren Little (1990) offers a useful four-fold taxonomy for examining collaboration: storytelling and scanning for ideas; aid and assistance; sharing; and joint work.

- In **Storytelling and Scanning for Ideas** the contacts are informal and teachers make occasional forays in search of specific ideas, solutions and reassurances. They gain information and affirmation in the quick exchange of stories, casual camaraderie and friendships that occur at a distance from the classroom. In this case, teachers do not feel as if there are any problems to be resolved and they exercise personal preference in who they talk with and how they use the information.
- **Aid and assistance** occurs when mutual aid or helping is readily available. Questions are interpreted as requests for help and there is the expectation that colleagues will give one another help and/or advice, as well as concern and sympathy, but not interfere in another's work in unwarranted ways. Sometimes the expression of empathy even has the potential to dissuade teachers from more analytic examinations of practice.
- In **sharing** of methods and materials or the open exchange of ideas and opinions, people make aspects of their work accessible to others and expose their ideas and intentions to one another. Sharing does not usually extend to commentary on curriculum, learning, and instruction.
- **Joint work,** as Warren-Little describes it, involves "encounters among teachers that rest on shared responsibility for the work of teaching (interdependence), with their motivation to participate grounded in needing each other's contributions in order to succeed in their own work and a confidence in the others' competence and commitment".

Collaboration can be a powerful mechanism for changing ideas and practices, particularly when it involves joint work that includes a balance of personal support with critical enquiry about present practice and future direction (Borko, 2004; Hudson-Ross, 2001) and sustained scrutiny of practice, but is not always easy. In fact, moderate conflict is essential for the development of high joint benefit, and the desire to avoid conflict can undermine this outcome (Engestrom, 1999).

Enquiry

Systematic analysis of the situation and professional reflection are regarded as core activities for both individual and collective construction of meaning. We have written elsewhere about having an e*nquiry habit of mind* – a habit of using enquiry and reflection to think about where you are, where you are going, how you will get there and then turn around and rethink the whole process to see how well it is working and make adjustments (Earl & Katz, 2002, 2005).

Knowledge creation, especially when individuals are involved in changing their practice, requires that individuals consider explicit knowledge and share, question and possibly adapt their respective tacit knowledge, in order to create new collective explicit knowledge. Little (2005) references a large body of research suggesting that conditions for improving learning and teaching are strengthened when teachers collectively question ineffective teaching routines, examine new conceptions of teaching and learning, find generative means to acknowledge and respond to difference and conflict, and engage actively in supporting one another's professional growth. The enquiry processes of questioning, reflecting, seeking alternatives, and weighing consequences promote the "transparency" of what otherwise might remain unobservable facets of practice, making tacit knowledge visible and open to scrutiny (Earl & Katz, 2002; Little, 2005).

Collaborative enquiry creates an opportunity for educators to work together searching for and considering various sources of knowledge (both explicit and tacit) in order to investigate practices and ideas through a number of lenses, to put forward hypotheses, to challenge beliefs, and to pose more questions. When educators have an enquiry habit of mind, they have developed a *way of thinking* that is a dynamic iterative system for organising ideas, seeking out information, and moving closer and closer to understanding some phenomenon together.

Leadership

Fullan (2004) makes the point that "if a system is going to be transformed, leadership at all levels must be the primary engine". Networked learning communities include many levels of leadership – both formal and informal. Networks have some system of leadership to direct the work of the network itself, which usually coexists

alongside the formal leadership of headteachers in schools. Within networks there are projects and activities that require direction and coordination.

Although the leadership literature continues to emphasise the role of principals/headteachers in successful change and instructional improvement, leadership models are increasingly focusing on what Rowan (1990) called "network" patterns of control, where leadership activities are distributed across multiple people (Smylie & Denny, 1990; Heller & Firestone, 1995). Formal leaders (e.g. headteachers) provide leadership by encouraging and motivating others, setting and monitoring the agenda, sharing leadership, providing support and building capacity. At the same time, networked learning communities encourage distributed leadership in schools and across the network, with many people with and without formal positions of authority providing a range of leadership functions such as leading particular initiatives, participating in collaborative groups, supporting colleagues learning and sharing their knowledge with others.

Accountability

Policy makers are demanding that schools focus on achieving high standards for all students, and requiring evidence of their progress (Fullan, 1999). Both external and internal accountability have a role to play in how change happens.

External accountability in networked learning communities means being open and transparent in showing policy makers and the public what they are doing and how well it is working. Strong external accountability systems can also contribute to the achievement of a widely shared sense of purpose, create a sense of urgency, provide "pressure" for change, and offer a forum for conversation about the work of schools.

Internal accountability is a process of using evidence to identify priorities for change, to evaluate the impact of the decisions, to understand students' academic standing, to establish improvement plans and to monitor and assure progress (Herman & Gibbons, 2001). As Elmore (2002) says:

> Knowing the right thing to do is the central problem of school improvement. Holding schools accountable for their performance depends on having people in schools with the

> knowledge, skill, and judgment to make the improvements that will increase student performance.

Internal accountability is what moves the agenda from schools where teachers and leaders are working hard and showing enthusiasm for change, to schools that are constantly engaged in careful analysis of their beliefs and their practices, to help them do things that they do not yet know how to do (Earl, 1999).

Building Capacity and Support

Harris (2001) defines capacity building as being concerned with creating the conditions, opportunities and experiences for collaboration and mutual learning. Years of school improvement research have shown that improving schools are ones that take charge of change, rather than being controlled by it (Rosenholtz, 1989; Hopkins, Ainscow & West, 1994; Stoll & Fink, 1996). As Senge (1990) describes it, a learning organisation is one that is 'continually expanding its capacity to create its future'. In networked learning communities the focus is on creating the conditions to support individual and collective learning through all of the processes described in the previous key features. Building capacity depends on intentionally fostering and developing the opportunities for members to examine their existing beliefs and challenge what they do against new ideas, new knowledge, new skills, and even new dispositions (Stoll, Fink & Earl, 2003). When networks are focused on learning, they intentionally seek out and/or create supporting activities, people and opportunities to push them beyond the status quo within their school and network development.

Chapter 4 Testing the Theory of Action

In Phase 3, we tested the theory of action for networked learning communities through a large-scale survey of all schools of 50% of the Networked Learning Communities using:[6]

- a carefully constructed survey instrument based on the theory of action from Phase 2 (the enablers, the extent and nature of knowledge creation and sharing, and changes in thinking and practice, as well as the degree of attachment to the network);
- change measures of *pupil attainment levels and in schools' value added performance* over the three years 2003-2005 at KS 2, 3 and 4.

The survey was developed with consideration to the individual key features identified in the theory of action and to the theorised interaction between such features both within schools and from school to network. The methodology and the survey were piloted in the Network of Performance Based Schools in British Columbia[7] and the instrument revised to include 148 items measuring the elements of the theory of action.

Because the unit of interest is the school, we decided to ask key individuals within each school to respond to group ("we" or "teachers in this school") rather than self ("I") referent statements on a survey, in order to yield more reliable school estimates and more variability between schools (Goddard et al., 2004). Each Headteacher was asked to select up five colleagues (possibly including themselves) to complete the survey. Participants were selected based on their ability to knowledgeably answer questions about network activities in their school.

Despite the efforts of the data collection team, not all schools who received the survey completed it. Thirty-eight percent (38%) of the surveys were returned, with 55% of schools represented in the analysis having returned at least one survey. Teachers were the most likely to be one of the respondents from a school (84% of schools) followed by headteachers (62% of schools), deputy headteachers (50% of schools), and teaching assistants (13%). Many other groups were represented as respondents (other – 24% of schools).

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[6] The details of the methodology for Phase 3 are included for the interested reader in Appendix A and the survey instrument is included in Appendix C.

[7] A detailed description of the pilot study is included in the methodology in Appendix B.

The primary analysis of the data was done by Professor Pam Sammons and Tamjid Mujtaba and included individual level descriptive statistics for each item, exploratory factor analysis of school and network features, internal reliability of scales and correlations of the factor scales with change in school level attainment scores between 2003 and 2005 at KS 2, 3 and 4.[8] We performed a number of additional analyses to explore particular issues of importance to this study – school level descriptive statistics for each item and for the factor scales, an analysis of respondents answering "don't know" to each item and scale, some multiple regression analyses and a cluster analysis. Details of these analyses are reported in Appendix D.

The exploratory factor analysis resulted in eight interpretable factors from the school focus questions and eight from the network focus questions. Although these factors were fairly consistent with the features in the theory of action, there were some differences. One of the school factors - **changes in thinking and practice** - captured the two dimensions of the intermediate outcomes – creation and sharing of knowledge and changes in practices. One of the network factors was a scale of **network influenc**e that reflects the mediating process between networked learning communities and the schools. The other factors were refinements of the enablers in schools and networks, as presented in the following table. **.**[9]

School Factors	Network Factors
School Focus	Network Focus
School Formal Leadership	Formal Leadership of School Leaders in Network Activities
School Distributed Leadership	Network Distributed Leadership
School Enquiry	Network Enquiry
School Relationships and Collaboration	Network Relationships
	Network Collaboration
Joint Work that Challenges Thinking	Joint Work that Challenges Thinking

[8] The report of detailed results of the statistical analyses by Prof. Pam Sammons and Tamjid Mujtaba is included in Appendix E. We have included excerpts from their report in this document as required. Methodological inquiries about this report should be directed to the authors.

[9] Details of the items that make up these factors are included in the report by Sammons and Mujtaba (Appendix E) and appear in various tables in the remainder of this report.

and Practices	and Practices
Developing Capacity in Collaborative Enquiry	

The scales that emerged from the factor analysis are strong, with high internal consistency among items in a scale. Cronbach alphas for the factors ranged from .79 to .97. On the basis of these results, we opted to use the empirically-derived factor scales for the subsequent analyses as summary measures, aggregated to form a mean score at the school level. We also included several single items that did not load on any other factor but are important in the theory of action – network attachment, and the number of staff members involved in the network.

Chapter 5 Findings From Phase 3

This chapter contains the major findings from the study. Chapter 6 presents interpretations based on the theory of action to provide a picture of the way these networked learning communities are operating and to bring increased understanding of the important contributors to successful networked learning communities.

The first two sections of this chapter give information about changes in pupil learning, thinking and practice, followed by detailed attention to the enablers, as they have been refined through the factor analysis, and discussion of their relationships to changes in thinking and practice, as well as pupil outcomes. The next section addresses the strength of attachment between the schools and the networks.

Changes In Pupils' Learning

Both network attachment and the number of teachers engaged with the network had significant correlations with one or more measure of pupil attainment. Many of the key features in the theory of action also had a correlation with some measure of pupil outcomes. However, significant associations did not occur for all pupil outcome measures. Since the time scale for the analysis is only 3 years, the relationships that do occur suggest that attainment may be associated with participation in a networked learning community.

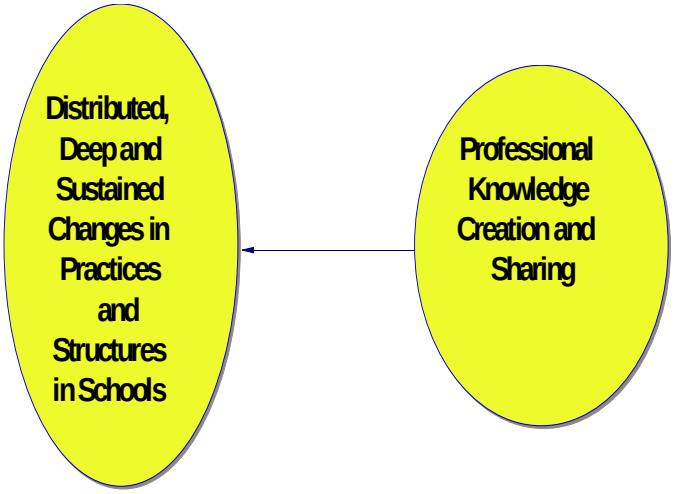
Changes in outcomes for pupils are the ultimate goal of any school reform activity. In this study, there were a number of significant relationships between network attachment and the key features of the elements in the theory of action with changes in *pupil attainment levels and in schools' value added performance* at KS 2, 3 and 4.

- Relationships between network attachment and/or the number of teachers engaged in the network were significantly related to some measures of pupil outcomes at each of the Key Stages (r=.14 – r=. 30), suggesting that network engagement is associated with enhanced pupil learning.

- Significant positive correlations (r=.17)were found for improvements in value added results at Key Stage 2 over the three years and improvements in mathematics (% of pupils achieving level 4) and the school factor *changes in thinking & practice* (r=.24). No statistically significant differences were found for change in English or science results.
- A number of weak but positive correlations were found between the scales related to *formal leadership, relationships & collaboration, network collaboration* and results in 2005 for English, science and mathematics (all in the range .14 to .22) indicating that schools with better scores on these areas of network activity tended to have higher levels of pupil attainment in 2005 in terms of the % pupils gaining a level 4+.
- At Key Stage 3 there was no evidence of any significant statistical correlations between change indicators (% achieving level 5+ in the core subjects) for attainment or the overall value added results and any of the school or network scales.
- At Key Stage 4 there was stronger evidence of positive associations. The statistical analyses across all networks (Mujtaba & Sammons, 2006) reported elsewhere showed that NLC secondary schools made gains at KS4 in attainment and value added over 2003-2005. There were five school or network scales that had statistically significant relationships with the change scores at KS4 for GCSE (%5A*-C) and value added. The strongest correlations were with the factor related to *overall network influence* and GCSE change score (r=.38), followed by the factor *school formal leadership* (r=.35) and GCSE change score. Other factors showing significant positive associations were *school distributed leadership (r=.26), developing capacity for collaborative enquiry*(r=.32*),* and *network relationships (r=.25). Network relationships* were also significantly related to value-added change (r=.29)

Changes in Thinking and Practices

Respondents in many schools indicated that there were changes in the thinking and practices of colleagues in the school (from 19%-55%, depending on the item). However, in many schools, there was little indication of changes in thinking and practice and some changes only occurred in a small number of schools (under 30%). Many reported changes that have the potential to influence learning for pupils, especially changes to teaching practices, use of innovative approaches and content knowledge. Fewer, however, indicated that they had engaged in the kind of changes that are associated with deep conceptual change (changing how they think about their teaching, unlearning previously help beliefs or approaches). The areas with the least change were relationships with pupils or their families.



Changes in thinking and practice are the intermediate outcomes that link the work of the networks and schools to changes in pupil outcomes. Although we theorised that there were two distinct processes in action, these theoretical constructs – changes in thinking (creation and sharing knowledge) and changes in practice were not distinguishable in the factor analysis and merged into one school-related factor.

As was mentioned above, changes in thinking and practice were significantly related to value added results at Key Stage 2 over the three years and improvements in Key Stage 2 mathematics (% pupils gaining level 4) but not to pupil attainment measures in KS3 or KS4.

Table 5.1 shows the percent of schools that agreed or strongly agreed with each of the items, as well as the percent of schools where schools indicated that they did not know, ordered from highest to lowest agreement.

Table 5.1 Changes in Thinking and Practice - % of Schools That Agreed or Strongly Agreed

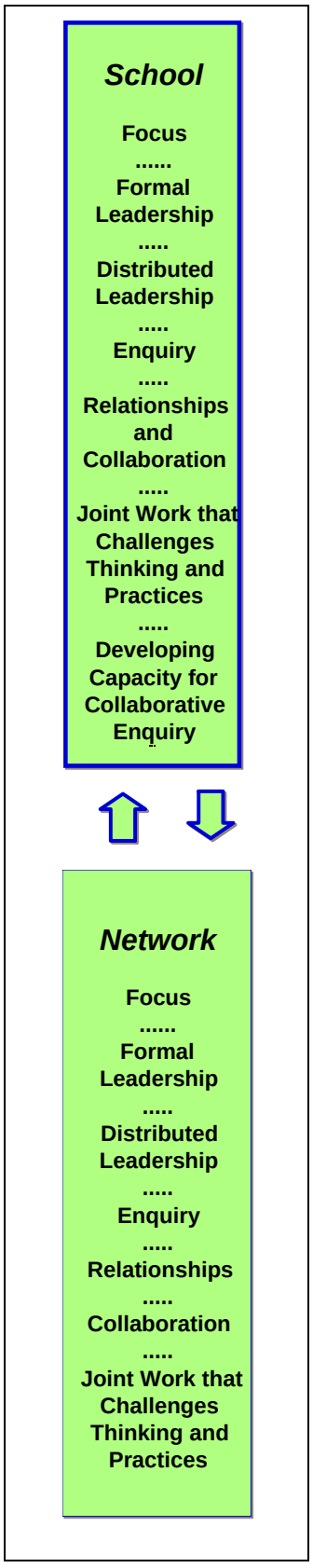
Item	% Agree or Strongly Agree	% Don't Know
Colleagues in our school have…		
Expanded what they know about teaching and learning	55	5
Used classroom practices common with their colleagues	49	6
Used innovative approaches in their classroom	46	6
Changed their way of thinking about pupil learning	46	5
Developed a common body of knowledge	43	10
Created innovative ideas and/or approaches to teaching & learning	43	6
Expanded what they know about content knowledge	42	10

Changed their teaching practices	41	5
Changed their assessment practices	40	8
Changed the way they think about relationships with their pupils	39	9
Made what they know explicit for others	39	8
Changed the way they use curriculum	39	8
Changed their way of thinking about their teaching	39	5
Used problems in practice as a start for generating new ideas	37	11
Changed their relationships with pupils	28	12
Unlearned previously held ideas and/or approaches	27	14
Changed the way they think about relationships with the families of their pupils	24	18
Changed their relationships with families of pupils	19	20

It is interesting to note the proportion of the schools that indicated that they don't know whether or not their colleagues have made these changes in their thinking and/or practice (from 5%-20%).

Relationships With Key Enablers

Within the refined key enablers, school formal leadership, school distributed leadership, school relationships and collaboration, network relationships, network collaboration, and developing capacity for collaborative enquiry all had statistically significant relationships with pupil outcomes and they were all significantly related to the intermediate outcomes of changes in thinking and practice.



In this section, we examine the key enablers within schools and networks, using the refined descriptors, as they emerged from the empirical analysis based on the data. A number of the key enablers had statistically significant relationships with pupil outcomes (school formal leadership, school distributed leadership, school relationships and collaboration, network relationships network collaboration, and school professional learning). These are explored more fully in the detailed sections below.

As can be seen in Table 5.2, the key enablers are all related to changes in thinking and practice, with the highest correlations being with network focus (r=.52), formal school leaders' engagement with the network (r=.51) , network enquiry (r=.48), networked distributed leadership (r=47), network relationships (r=.47) and developing capacity for collaborative enquiry (r=.44).

The results of two multiple regression analyses (Appendix D) using changes in thinking and practice and network influence as dependent measures, suggests that developing school capacity for collaborative enquiry, having clear, high leverage school and network foci and having more colleagues attached to the network were the most important factors in predicting changes in thinking and practice. The best predictive model for network influence was network attachment, network focus, network enquiry and engagement in the network of formal leaders from the school.

It is important to note that the network key enablers were measured through asking about colleagues in the school who were engaged in network activities. There are two important points to bear in mind when reading this section. First, the

percentage of agreement regarding network enablers refers to a subset of colleagues who were engaged in network activities. Second, colleagues working on network activities are located in the schools, as is their network activity work. The correlations for the network features represent the responses from this more engaged group.

Table 5.2 Key Enablers Correlation with Changes in Thinking and Practice

School Scales	*Correlation with Changes in Thinking and Practice*	*Network Scales*	*Correlation with Changes in Thinking and Practice*
School Focus	.40	Network Focus	.52
School Formal Leadership	.32	Formal School Leaders' Engagement with the Network	.51
School Distributed Leadership	.42	Network Distributed Leadership	.47
School Enquiry	.35	Network Enquiry	.48
School Relationships and Collaboration	.29	Network Relationships	.47
		Network Collaboration	.38
School Joint Work that Challenges Thinking and Practice	.31	Network Joint Work that Challenges Thinking and Practice	.40
Developing School Capacity for Collaborative Enquiry	.44		

In the following sections, the results are displayed for each enabler based on responses about both the school and network in the same table to allow comparisons. Overall, schools expressed agreement with the engagement of their school and network in the enabling activities, with less agreement for items about the strength of network activities than activities in their own school. There were also differences in degree of emphasis to statements in terms of strongly agree, agree or slightly agree rather than disagree. The data are presented in tables of agreement, with comments about the

relationships of the enabler with pupil outcomes and with the intermediate outcome of changes in thinking and practice.

Focus In Schools and In Networks

Both school and network focus are correlated with changes in thinking and practice, with a slightly higher relationship with the focus in networks. The schools generally agreed that they had a well established focus related to pupil needs. Although the percentages were lower for the network focus, it was also seen as clear and related to teaching and learning. The exception in both contexts was having their school or their network focus displayed for others to see.

Although neither the school focus nor the network focus was statistically related to changes in pupil learning, they were both highly correlated with the intermediate outcome - changes in thinking and practice (school, r= .40; network, r= .52). Table 5.3 includes the responses to items related to school and network focus. Generally, schools indicated that both the school and network focus were clear, explicit, related to pupil needs and linked to teaching and learning, although the percentages were somewhat higher for the school than for the network. Somewhat fewer, but still a majority indicated that the focus was research-based and that they had opportunities for professional learning related to their focus. Even fewer of the schools indicated that either their school or their network focus was displayed for others to see.

Table 5.3 Focus in Schools and Networks - % of Schools That Agree or Strongly Agree

School			Network		
Item	**% agree or strongly agree**	**% DK**	**Item**	**% agree or strongly agree**	**% DK**
Our school focus is connected to pupil needs	90	1	Our network focus is connected to pupil needs	81	5
			Our network focus is strongly linked to teaching & learning	85	4
Our school has an explicit school learning focus	86	1	We have an explicit network focus	71	7
Colleagues in the school have a shared understanding of	78	1			

school focus					
Colleagues in the school have had professional learning opportunities in relation to school focus	75	2	Colleagues in this school have had professional learning opportunities re network focus	64	7
Our school focus is research based	71	8	Our network focus is research based	68	12
			The school and network focus are closely related	58	9
Our school focus is displayed for everyone to see.	41	4	Our network focus is displayed for everyone to see	31	9

There were also some items for which the schools indicated that they "did not know" about the focus or network focus.

Leadership in Schools and in Networks – Formal and Distributed

Two different kinds of leadership were investigated in this study – formal leadership and informal or distributed leadership. Each of them was associated with changes in pupil learning and in thinking and practice. Formal leaders were engaged in a range of activities to steer the school improvement process, provide support and build capacity in others. They were more active in enabling activities in the school than in the network. Others in the schools who were not formal leaders were also very engaged in a wide range of leadership activities that supported their school improvement direction, and encouraged and supported others. They were also more involved in these activities in the school than in the network.

Formal leadership in the school had weak but significant relationships with Key Stage 2 results in 2005 for English (r=.14) and maths (r=.14). At Key Stage 4 Formal leadership in the school was correlated with GCSE change score (r=.35). Formal leaders' involvement in enabling activities in the school was correlated with changes in thinking and practice (r=.32) and their involvement in enabling activities in the network was also correlated with changes in thinking and practice (r=.51).

Distributed leadership in schools was related to GCSE change score (r=.26) and with changes in thinking and practice (r=.42). Distributed leadership in networks was correlated with changes in thinking and practice (r=.47).

The data are presented below for formal leadership in schools and networks (Table 5.4), followed by distributed leadership in schools and networks (Table 5.5).

Table 5.4 Formal Leadership in Schools and Networks - % Of Schools That Agreed or Strongly Agreed

School			Network		
Item	**% agree or strongly agree**	**% DK**	**Item**	**% agree or strongly agree**	**% DK**
Formal Leaders in Our School…			**Formal Leaders in Our School…**		
Take responsibility for the improvement process	86	1	Take responsibility for the improvement process in our network	54	12
Monitor progress in our school	85	0	Monitor progress in our network	54	11
Coordinate professional activities	83	1	Coordinate professional activities in network	67	8
Fairly represent what is happening in the school to the public	82	2	Fairly represent what is happening in our network to the public	47	16
Make information readily available	80	1	Make information from the network readily available	55	9
Create ways for school community to have a say	79	1			
Provide resources for colleagues to participate in professional activities	78	0			
Encourage colleagues to seek out expert advice re teaching & learning	77	2			
Enable participation by key stakeholder groups	77	2	Enable participation by key stakeholder groups in our network	50	11
Provide time for colleagues to participate in professional activities	75	0	Provide time for colleagues to participate in professional activities	64	5
Take opinions of colleagues in our school into consideration	75	1	Take opinions of colleagues in our school into consideration	58	8
Help us keep our school focus when other initiatives encouraged	70	2	Help us keep our network focus when other initiatives encouraged	56	8

Table 5.5 Distributed Leadership in Schools and Networks - % of Schools That Agreed or Strongly Agreed

School			Network		
Item	**% agree or strongly agree**	**% DK**	**Item**	**% agree or strongly agree**	**% DK**
Colleagues in Our School…			**Colleagues in Our School…**		
Are engaged in coordinating activities in our school	85	0	Are engaged in coordinating network projects	53	10
Were involved in establishing school action plans	82	2	Were involved in establishing network action plans	49	13
Enable colleagues to have resources to participate in professional activities	74	1			
Involved in evaluating school progress	73	2	Are involved in evaluating network progress	48	12
Openly share info about school activities with parents/public	72	2			
Enable colleagues to have flexibility to engage in professional activities	70	2			
Encourage others to seek out expert advice in relation to teaching & learning	70	2			
Help keep school focus when other initiatives encouraged	68	2	Help keep network focus when other initiatives are encouraged/mandated	44	11
Have had professional learning opportunities about leadership	60	6			

Once again, there were some items related to leadership for which the schools indicated they “did not know”, especially in relation to the network.

Enquiry in Schools and in Networks

Although there is no association between enquiry in schools and networks with changes in pupil learning, both are associated with changes in thinking and

practice. Many schools reported being engaged in some forms of enquiry (over 50%) but a substantial number of schools were not. The lowest participation was in activities that appealed to research or evidence for improvement.

Enquiry (in schools or in networks) was not associated with changes in pupil learning but both were associated with changes in thinking and practice (school r=.35; network r=.48). Table 5.6 presents the items that make up the enquiry scale, with agreement for schools and networks. There was high agreement that colleagues learned from successful initiatives in schools, with somewhat lower agreement to the same item in networks. Less than 2/3 of schools were engaged in systematic analysis of data, reflection about initiatives, monitoring initiatives, learning from failed initiatives. Even fewer (25-45%) did the same in the network. The least frequent activities in both schools and networks were drawing on research to improve practice and sharing and discussing research with colleagues.

Table 5. 6 Enquiry in Schools and Networks - % of Schools That Agreed or Strongly Agreed

School			Network		
Item	**% agree or strongly agree**	**% DK**	**Item**	**% agree or strongly agree**	**% DK**
Colleagues in Our School…			**Colleagues in Our School…**		
Learn from successful initiatives within the school	75	2	Learn from successful initiatives within the network	52	9
Engage in systematic analysis of data with school colleagues	62	1	Engage in systematic analysis of data with network colleagues	27	15
Monitor initiatives to make sure they are working	61	2			
Regularly discuss past activities or projects with school colleagues to determine what made them work well or not so well.	60	1	Regularly discuss past activities or projects with network colleagues to determine what made them work well or not so well	45	9
Learn from failed initiatives within the school	57	3	Learn from failed initiatives within the network	39	12
Regularly draw on research/expertise to improve	50	3	Regularly draw on research/expertise to	43	10

practice			improve practice in the network		
Share and discuss research on effective teaching methods with school colleagues	49	2	Share and discuss research on effective teaching with network colleagues	42	10

There were some items related to enquiry for which the schools indicated they did not know, especially in relation to the network.

Relationships And Collaboration in Schools and in Networks

Although "Relationships" and "Collaboration" remained separate key enablers in the network, they merged into a single factor in the school. In addition, some items separated into a new factor "Joint Work that Challenges Thinking and Practice" in both school and network. Relationships and collaboration in schools and relationships in networks were related to changes in pupil attainment, as was network joint work that challenged thinking and practice. All the scales were related to changes in thinking and practice.

Several refinements to the concepts of relationships and collaboration emerged from the analysis. "Relationships and Collaboration" in schools came together as a single scale. For networks, relationships and collaboration were separate factors. Another factor emerged in both schools and networks that we have called "Joint Work that Challenges Thinking and Practices" because the items that make it up are activities that require deeper changes to practice. School "Relationships and Collaboration" were significantly related to pupil learning in science (r=.14) at Key Stage 2 and network "Joint Work that Challenges Thinking and Practices" was related to English (r=.15), science (r=.14) and Mathematics (r=.14) at Key Stage 2. Network "Relationships" was related to GCSE change (r=.25) and VA change (r=.29) at Key Stage 4. All of these scales were related to changes in thinking and practice with correlations ranging from .33 to .51.

Table 5.7 gives the items for the scales for "Relationships and Collaboration" in schools and networks. In schools, there was a high degree of agreement (over 80%) that colleagues trust one another, seek and give advice and engage in professional conversations and activities to support one another. The high frequency items were mostly of the kinds of activities that Little (2000) describes as story telling, scanning for ideas, aid and assistance and sharing. There were very almost no responses of "don't

know" in this scale. These same activities were evident in 50%-70% of the networks and there were more responses of "don't know" (3%-17%).

Table 5.7 Relationships and Collaboration in Schools and Networks

School Relationships and Collaboration % of Schools That Agreed or Strongly Agreed

Item	% agree or strongly agree	% DK
Colleagues in Our School…		
Are willing to give professional advice/support	90	0
In this school discuss professional issues regularly	88	0
Seek professional advice/support from one another	86	1
Believe they enhance practice by working with one another	84	1
Work together on school projects	84	0
Work together to solve professional problems	84	0
Look out for one another	83	0
Feel supported to try new ideas	82	0
Trust one another	81	0
Feel responsible to help each other do professional best in school	80	0
Explore teaching approaches for particular groups of pupils	78	1

Network Relationships - % of Schools That Agreed or Strongly Agreed

Colleagues in Our School…		
Shared understanding of network focus	60	4
Trust network colleagues	57	8
Share the work associated with network projects	53	5
Feel supported by network colleagues re new ideas	52	6

	Feel responsible to help network colleagues do their professional best	51	7
	Are aware of expertise of colleagues in the network	49	5
	Look out for network colleagues	48	9
	Have had professional learning in the network about relationships	45	11
Network Collaboration - % of Schools That Agreed and Strongly Agreed			
	Colleagues in Our School…		
	Are willing to give professional advice/support to network colleagues	81	5
	Believe they enhance practice by working with network colleagues	72	6
	Work together on projects with network colleagues	66	5
	Explore teaching approaches for particular groups w network colleagues	63	7
	Seek professional advice from colleagues in network	58	7
	Discuss professional issues regularly with network colleagues	55	7
	Work with network colleagues to solve professional problems	53	8

Table 5.8 details the items for the scales for “Joint Work that Challenges Thinking and Practices”. These items are similar to Little’s description of joint work, the kind of collaboration that includes shared responsibility for the work of teaching, needing each other’s contributions in order to succeed in their own work, and working together in ways that require the participants to put their own practices up for investigation and challenge. In our case, the items that made up this scale were more focussed on the kinds of interaction that area necessary part of conceptual change and knowledge creation like working together, being receptive to feedback on their teaching from others, talking openly with colleagues about differing views, opinions and values and dealing openly

with conflicts. Table 5.8 gives the items in these scales. These practices were much more prevalent in schools than in networks and

Table 5.8 Enquiry-based Joint Work that Challenges Thinking and Practices in Schools and Networks- % of Schools That Agreed or Strongly Agreed

Item	% agree or strongly agree	% DK	Item	% agree or strongly agree	% DK
Colleagues in Our School…			**Colleagues in Our School…**		
Share lesson plans, teaching activities	79	0	Share lesson plans, teaching activities with network colleagues	38	10
Work together with school colleagues to develop schemes of work/lesson plans	79	0	Work together with network colleagues on schemes of work/lesson plans	30	13
Are receptive to feedback on their teaching from school colleagues	73	2	Are receptive to feedback on teaching practices from network colleagues	30	16
Talk openly with school colleagues about differing views, opinions, values	65	0	Talk openly about differing views, opinions, values with network colleagues	48	8
Deal openly with conflicts that arise in our school	62	1			
			Professional learning opportunities in the network re collaboration	39	13

There were some items related to relationships and collaboration and joint work that challenges thinking and practices for which the schools indicated that they did not know, especially in relation to the network.

Developing Capacity for Collaborative Enquiry in Schools

A new factor emerged from the analysis called "developing capacity for collaborative enquiry in schools" made up of items about professional learning fort and having opportunities to undertake collaborative enquiry. This factor was related to both attainment at KS 3 and changes in thinking and practice.

Another new factor emerged in the analysis of the data related to a particular kind of capacity development at the school level. We have called this factor "Developing Capacity for Collaborative Enquiry". This scale is related to GCSE change score (r=.32) and to changes in thinking and practice (r=.44). The items that make up this scale are all

connected to having opportunities to learn about and engage in activities that help teachers work together in collaborative relationships that are focused on enquiry and help them challenge one another's assumptions.

Table 5.9 Developing Capacity for Collaborative Enquiry in Schools - % of Schools That Agreed or Strongly Agreed

Item	% agree or strongly agree	% DK
Colleagues in Our School…		
Have had professional learning opportunities in relation to collaboration	54	7
Have had professional learning opportunities about working relationships	52	7
Have had professional learning opportunities about enquiry	41	8
Regularly challenge each other's assumptions	36	6

There was a small percentage of "don't know" responses for these items.

Strength of Attachment to the Network

Participants were asked how active the school was in the network and how many colleagues were involved in network activities. Both of these items were correlated with at least one measure of pupil attainment and there was a correlation between the reported strength of attachment and changes in thinking and practice (.48)

One of the key issues in considering the role of networked learning communities is the strength of attachment between any school and its network. Strength of attachment can be a function of large numbers of people engaging with the network, or it can be facilitated by a smaller number of "boundary spanners" who form the link between the network and the schools. Although the schools' level of engagement in relation to the key enablers gives a sense of the quality of the attachment, it does not give information about the numbers and roles of people involved. We addressed this issue in a variety of ways. First, we asked the schools the extent to which their school was attached to the network. We also considered the number of colleagues involved in the network, as well as the types of interactions and activities that they were involved in. Finally, we conducted an analysis of the "don't know" responses on the survey. Because the respondents were selected on the basis of their knowledge about the school's involvement in the network, when there are many schools where these people do not know the answer to a question, it is possible that the strength of attachment is limited.

In answer to the question: “To what extent is your school active in your network?” virtually all of the schools indicated some level of attachment. However, only 47% characterised their attachment as “a great deal”; the rest indicated “some” (38%) or “a little” (7%), with 3% indicating “don’t know”.

The level of activity in the network was related to change scores in KS3 Maths (r=.25) and Science (r=.30) and, as Table 5.10 shows, it was related to changes in thinking and practice and to all of the refined key enablers. The correlation with network scales is higher than with the schools scales because the question was asked in relation to colleagues who are involved in network activities.

Table 5.10 Correlations With Network Attachment for School and Network Scales

School Scales	***Correlation with Network Attachment***	***Network Scales***	***Correlation with Network Attachment***
Changes in Thinking And Practice	.44		
School Focus	.35	Network Focus	
School Formal Leadership	.36	Formal School Leaders Engagement with the Network	.63
School Distributed Leadership	.39	Network Distributed Leadership	.66
School Enquiry	.36	Network Enquiry	.59
School Relationships and Collaboration	.33	Network Relationships	.58
		Network Collaboration	.48
School Joint Work that Challenges Thinking and Practices	.34	Network Joint Work that Challenges Thinking and Practices.	.60
Developing Capacity for Collaborative Enquiry	.38		

There was a significant correlation between the number of colleagues in the school who have been involved in the network and English (r=.19), Maths (r=.15) and Science (r=.21) at KS2 and with value-added change scores at KS3 (r=.26). As can be seen from Table 5.11, over half (52%) of the schools said that a majority of colleagues in the school are involved in network activities. This leaves a large percentage (48%) of the schools in which fewer than half of colleagues are involved in network activities.

Table 5.11 Percentage of Colleagues in the School Involved In Network Activities

How many of your colleagues are involved in network activities?	Percentage of Schools
10%	10
25%	14
50%	13
75%	15
90%	37
Don't Know	7
Blank	4

Many different groups of people from schools were involved in network activities (Table 5.12). Teachers and headteachers, followed by pupils, were involved in almost all schools. Other staff members were involved in many schools; external people were represented in about half of the schools. Parents were only involved in 39% of the schools.

Table 5.12 Percentage Of Schools In Which Each Group Was Involved In Network Activities

	Percentage of Schools
Teachers	99
Headteacher	97
Pupils	93
Teaching/classroom assistant	86
Deputy headteacher	83
Support staff	65
External consultants	63
Governors	59
Local authority personnel	56
Assistant headteacher	47
Parents	39

Note: Most schools gave multiple responses.

It was interesting to us that there were many cases where the schools answered "don't know" to some of the items. Since the respondents were selected by the headteacher as those who were most knowledgeable about the school's involvement in

the network, this seemed like an important issue to investigate. The mean percent of "don't know" responses, displayed in Table 5.13, was created by (a) calculating the mean percentage of teachers who responded "don't know" to each item and then (b) averaging over the schools and scales.

Table 5.13 Mean % of Don't Know Responses For Scales and Single Item Factors

Scale	% Schools DK	Range of Don't Know for Items in the Scales	Scale	% Schools DK	Range of Don't Know for Items in the Scales
Changes in Thinking and Practice	9	5-20	Network Influence	8	4-15
Schools			***Networks***		
Focus	3	1-8	Focus	8	4-12
Formal Leadership	1	0-2	Formal Leadership	10	5-17
Distributed Leadership	2	0-6	Distributed Leadership	12	10-13
Relationships and Collaboration	0	0-1	Relationships	7	4-11
			Collaboration	12	8-16
Enquiry	2	1-3	Enquiry	11	9-15
Joint Work that Challenges Thinking and Practices	1	0-2	Joint Work that Challenges Thinking and Practices	12	8-16
Professional Learning	7	6-8			
Single Item Factors					
School Awareness of One Other's Expertise	0		Sharing information about the network with parents and the community	15	
School - Sharing Work	1		Leadership Learning Opportunities in the Network	16	
School - Challenging One Another's Assumptions	13		Network Attachment	3	

It is noteworthy that for 9% of the schools, there was a “don’t know” response for changes in thinking and practice, with a range from 5-20%. A similar percentage (8%, with a range from 4-15%) did not know how much influence the network had on their school. There were strikingly higher levels of “don’t know” for questions related to the network. This suggests that in some of the schools the respondents had so little knowledge of what was happening with others in their schools or of the influence of the network that they were unable to choose a descriptor.

Network Attribution

Two sets of items on the survey addressed perceptions of extent to which involvement in the network had influence the activities within the school related to the key features and the importance of the network in improving a number of dimensions related to changes for pupils and changes in practices. Table 5.14 shows the percentage of schools saying that involvement in the network had “a great deal” of influence on activities in the school in relation to of the key features. Less than one-third of the schools indicated that involvement in the network had a great deal of influence on their activities.

Table 5.14 Influence of Involvement in the Network - % of Schools Indicating A Great Deal

Item	% A great deal	% DK
To what extent has involvement in the network:		
influenced purpose & focus	30	4
influenced leadership	27	10
influenced collaboration	23	5
Involvement has influenced enquiry	20	10
Involvement has influenced relationships	18	5
Involvement has influenced accountability	14	15

Table 5.15 includes the percent of schools indicating that the network was “very important” or “somewhat important” in changes for pupils and changes in practice. Only about a quarter of the schools felt that involvement in the network was very important in improving pupil engagement, pupil motivation and improving school practices and a very

small percentage (10%) indicated that involvement in the network was very important in improving pupil attainment or pupil behaviour.

Table 5.15 Importance of Network in Changes for Pupils and Changes in Practice - % of Schools Indicating Very Important

Item	Very important	% DK
How important has involvement in the network been in:		
improving pupil engagement	28	7
In relation to other initiatives, importance to improving school practice	25	8
Improving overall practice in your school over the last 4 years	25	7
Improving pupil motivation	24	7
Improving pupil attainment	16	8
Improving pupil behaviour	14	9

Opportunities for Professional Learning

The survey contained a series of items to determine the extent to which school and network personnel had an opportunity for professional learning in relation to each key feature. Table 5.16 shows the percentage of schools that indicated having opportunities for professional learning in each area. There was considerable agreement in a substantial percentage of schools that professional learning opportunities were available, especially in relation to focus and leadership. Opportunities were less available in the networks than in the schools and there were fewer opportunities for professional learning in working relationships, collaboration and enquiry.

Table 5.16 Professional Learning Opportunities in Schools and Networks - % Indicating Agree or Strongly Agree

Item	% Agree or Strongly Agree	% DK	Item	% Agree or Strongly Agree	% DK
Colleagues in This School Have Had Professional Learning Opportunities in the School Related to…			**Colleagues in his School Have Had Professional Learning Opportunities in the Network Related to…**		
School focus	75	2	Network focus	64	7
Leadership	60	6	Leadership	41	15
Collaboration	54	7	Collaboration	38	13
Working relationships	52	7	Working relationships	45	11

Enquiry	41	8	Enquiry	39	14

Summary

This chapter contains a detailed account about the way that networked learning communities and the schools within them work. In the next chapter we identify, interpret and provide support for what we believe are the key learnings when all of the findings are considered as a whole.

Chapter 6 Pulling It All Together: Learning From The Aporia Investigation

This research trilogy has produced a massive amount of data that offers considerable fodder for reflection. In this chapter we have tried to expand on the key learnings that we have identified with important applications for decisions in policy and practice and add to the evidence base about how networks work in educational contexts.

Networked Learning Communities are Complex

It is immediately evident that networked learning communities are complicated and differentiated entities. The discussions with the international team and our own investigation of the literature during Phase 2 of the study produced a picture of a sophisticated organisational form that has considerable flexibility but where it was likely that some features were particularly important to the ultimate goal of improving pupil learning. We developed a theory of action in which changes in pupil learning depend on changes in how teachers and headteachers think about teaching and learning and how they actually act in their schools and classrooms. We theorised that knowledge creation should result, as David Hargreaves (1998) argues: "…in visible and substantial changes in how teachers and headteachers think, what they do in their schools and classrooms and how they do it – changes that are designed to deepen, enhance and differentiate learning for all pupils. These changes that teachers and schools make in their practices are the mechanisms for enhancing ***pupils learning*** and influencing their long-term successes"

The theory is that individuals are the connectors of schools to networks (and networks to schools) and that these relationships provide the link for uploading and downloading ideas, activities and interactions that can influence the way people think and act in their daily work. We asked 4-5 people in each school who were most knowledgeable about the school's connection to the network to complete the survey for Phase 3 (Appendix D), on behalf of their colleagues. The survey contained questions about the key features in relation to their school and their school's involvement in the network. Their responses give a very rich picture of how the schools were operating, individually and within their networks.

The data from the survey confirmed the complexity of the way that networked learning communities work. As we predicted, the key features were all related to one another in a range of ways and their relationships with changes in thinking and practice and pupil outcomes were also interconnected. Nevertheless, there were some distinct patterns that help to refine the theory and suggest ways to make networks of schools more effective and more efficient in changing schools so that they serve pupils better. As we will describe below:

- Networked learning communities can influence pupil learning
- Strength of attachment to the network is important
- Changing Thinking and Practice is the Key
- Schools are the locus of changes in thinking and practice
- Relationships and collaboration are the beginning… not ends in themselves
- Joint work that challenges thinking and practices is the critical core of collaboration
- Collaborative enquiry is an important new skill
- School and network foci need to be right, shared and understood
- Formal leadership matters
- Leadership is distributed across schools and networks
- Pupils and families are absent
- It is hard to see the influence of networks

Networked Learning Communities Can Influence Pupil Learning

This study reinforces findings from other research that participation in a network of schools is related to enhanced pupil outcomes. There are only a few studies that address the impact of network participation on pupil learning and little systematic research about the way that networks work in educational contexts or about what to emphasise to foster successful and productive networked learning in education (Hwang et al. 2004). The CUREE review (Cordingley et al., 2005) found 11 studies with evidence of impact on pupils and only 3 of those were related to attainment, with the others focused on such things as engagement, motivation, social skills, and attendance. They concluded that networks can be a highly effective vehicle for improving learning and attainment. Mujtaba and Sammons (2006), also studying the NLC Programme in England, found that, as with the national trend, there had been significant improvements in average attainment levels in NLC schools during this three year period. The attainment levels

amongst NLC schools are somewhat lower than the national average. However, these schools are serving more disadvantaged communities than schools nationally.

The current study provides evidence that when networks of schools work together, there is an impact on pupil learning. The number of people in the school who are active in the network was positively correlated with pupil outcomes in English, Maths and Science at KS2 and value-added scores at KS3. The factor "overall network influence" was positively correlated with GCSE change score and the level of network attachment was significantly related to changes in Maths and Science in KS3, and was correlated with the intermediate outcome of changes in thinking and practice in schools. Although these associations do not seem to have any predictable pattern, their occurrence suggests that there is a connection between the participation in a network and improved pupil attainment. However, just having membership in a network of schools does not mean that significant changes will occur in schools or that pupils will benefit. The remainder of this chapter describes the features that emerged as most promising in the way that networks work and provides insights for future decisions about policy and practice.

Strength of Engagement in the Network Is Important

Although networking schools can create the conditions for influencing how teachers and leaders think and act, it is not guaranteed. It is quite clear from these data that connection to the network needs to be strong and pervasive. Church et al., (2002) describe the people who form the links between schools and networks as the threads that connect the knots of activity. We have thought of them as the links for uploading and downloading ideas. Our evidence suggests that it is important to have extensive and strong links if the intention is to influence pupil learning. In this study, the number of colleagues involved in network activities was significantly related to pupil outcomes and to changes in thinking and practice. In addition, the strength of the associations between the network scales and changes in thinking and practice for the subgroup of teachers who were active in network activities suggests that having more staff engaged in network activities results in more changes in how they think and act.

Even though all of the schools were members of a networked learning community, only about half of the schools indicated that they had the majority of the staff involved or were very actively engaged in the network. But, changes in thinking and practice in schools was highly correlated with both of these activities. It seems that many of the schools were not sufficiently engaged in the network for it to influence their daily routines or practices in ways that would make a difference for pupils. This is supported by the fact that many schools indicated that their involvement in the network did not have significant influence on the focus, leadership, collaboration, enquiry, accountability or relationships in their school and that they felt the influence of the network on pupils was largely in improving engagement and motivation but not attainment or behaviour.

Without intensive involvement in the network either of many people or of key people who serve as boundary spanners and have considerable influence in the school, networks cannot leverage sufficient change to influence classroom practices in significant ways.

Changing Thinking and Practice Is the Key

In the final analysis, nothing really changes for pupils unless there are changes in the hearts and minds of the adults in schools who work with them. Even though there is considerable evidence it this study of activity and commitment in the schools and the networks, we were surprised that fewer than half of the schools indicated that there had been changes in the areas that were included in the scale "changes in thinking and practice". Only 40 - 50% said that colleagues had used innovative approaches in their classrooms, changed their way of thinking about pupil learning, developed a common body of knowledge, used common practices with their colleagues, created innovative ideas or approaches to teaching and learning expanded what they know about content, changed their teaching or assessment practices. Between 20 and 40% said that they had made what they know explicit for others, changed the way they think about relationships with their pupils, changed the way they use curriculum, changed their way of thinking about teaching, used problems in practice as a start for generating new ideas, or unlearned previously held ideas and/or approaches.

These are the kinds of changes that are essential for knowledge creation and transformation of practice in schools. Although networking schools has the potential to create the conditions for these changes to occur, their absence suggests that the schools are not yet engaging in the kind of conceptual change, reflection and challenging of tacit knowledge that will maker them knowledge creating institutions.

Schools are the Locus of Changes in Thinking and Practice

In our theory of action, schools are where new knowledge and conceptual change operate to change how teachers and headteachers think and act. Networks influence changes in thinking and practice in schools, which are in turn related to improved pupil outcomes. These changes are the mechanisms for connecting the work of networks to enhanced pupil learning and all of the key features in the theory of action are potential contributors to creating the conditions for changes in thinking and practice to occur.

Schools indicated considerable activity in all of the key features and all of the key features for schools were significantly related to changes in thinking and practice, something that could happen without their being involved in a network of schools. This level of activity lends support to the notion that schools are the place where the daily work of change happens. Although the level of activity for each of the key features in networks was lower than in schools, the correlations with thinking and practice were actually higher for the subgroup of colleagues who were actively engaged in network activities, supporting the conviction that there is value added for schools from being connected to the network, as these “boundary spanners” connect the work of the school to the ideas that emerge from the network.

Changes in pupil learning related to network involvement depend on ideas and processes promoted by the network penetrating into the working lives of teachers. Networks of schools can provide support, encouragement, new ideas, enquiry and challenge to promote and foster changes in schools that will enhance pupil learning and success across all of the schools. The networked learning communities that work are likely to be ones that also link and support professional learning communities in schools so that there is a strong local locus of change for teachers, enhanced by the strength of ideas and support from the network of schools.

Relationships and Collaboration are the Beginning … Not Ends in Themselves

There is an ongoing debate about the importance of relationships and collaboration in networks, particularly in relation to the position of trust in productive relationships and how much trust must be present within these relationships. We found that the new factor school relationships and collaboration, which included items about giving advice, discussing professional issues, working together on projects, looking out for one another and trusting one another had a weak association with pupil attainment in KS2 and it had the lowest (still significant) positive correlation with changes in thinking and practice, suggesting that working together in schools is an important activity but that it may not be as powerful in changing how teachers think and act as some of the other features. The vast majority (over 75%) of schools indicated agreement with the statements related to relationships in their school. These collaborative activities may be ones of interaction among colleagues who get along and support one another as a routine course of their work but do not test the status quo.

There was a difference in the way that relationships and collaboration functioned in the network context. Relationships among colleagues in the schools who were involved in the network (things like trusting network colleagues, having a shared understanding, feeling responsible for one another, being aware of one another's expertise and feeling supported by one another) was associated with attainment at KS4 but collaboration (giving advice, working together on projects, seeking professional advice and discussing professional issues giving advice, working together on projects, seeking professional advice and discussing professional issues) was not. Although both were correlated with changes in thinking and practice, the correlation was higher for the relationships scale than for the collaboration scale. At the network level, there was considerable agreement that colleagues from the schools who are involved in the network were engaged in the relationship activities (between 40-60%) and even more of them agreed that they participated in the collaborative activities (50-80%).

These findings suggest that relationships and collaboration may operate differently within schools than across schools within the network. Relationships that embody trust, shared understanding and collective responsibility appear to be more

important dimensions of interaction in the network than doing things together. In the schools, comfortable relationships and working together are important for changes to happen within the school but they are all connected to one another. These activities in schools are a necessary but not sufficient requirement for networked learning communities to make a difference.

At the level of the network, however, relationships in the network were more strongly related than doing things together to changes in thinking and practice in the schools and even to pupil attainment. As will become evident in the next section, trusting relationships with shared understanding and knowledge of one another may be necessary for working and reflecting together, especially when the participants have different orientations and views and they are facing challenging issues (Lieberman and Grolnick, 1996).

Joint Work that Challenges Thinking and Practices is the Critical Core of Collaboration

An important and interesting finding in this study was the emergence of a new factor for both schools and networks that we have called "joint work that challenges thinking and practices". This factor is a qualitatively different type of collaboration than was mentioned in the previous section that requires participants to suspend judgement, challenge their assumptions and intentionally seek out new information, in the quest for understanding. Although joint work that challenges thinking and practices was not related to pupil outcomes in the data, both the school and network scales were related to changes in thinking and practice.

This factor is similar to the notion of joint work that Little (1990) described as "encounters among teachers that rest on shared responsibility for the work of teaching (interdependence), with their motivation to participate grounded in needing each other's contributions in order to succeed in their own work and a confidence in the others' competence and commitment". In our case, the items that made up this scale were more focussed on the kinds of interaction that are a necessary part of conceptual change and knowledge creation like working together, being receptive to feedback on their teaching

from others, talking openly with colleagues about differing views, opinions and values, and dealing openly with conflicts.

Joint work that challenges thinking and practices is not easy. There is lower agreement on the changes in thinking and practice items that are most closely associated with this kind of collaboration (e.g. making explicit what you know, unlearning, using problems to generate new ideas), than for items that reflect more straightforward activities. This kind of interaction presumes a level of trust and personal confidence that allows the participants to be honest, transparent and willing to examine their own beliefs and practices. It also suggests being able to live with ambiguity and to challenge one another in productive ways.

We believe that this kind of joint work that challenges thinking and practices may be at the heart of the power of networks. Networks can provide the forum for colleagues to address genuinely new, and often difficult, ideas in a safe environment, away from the risk of retribution or censure in their daily place of work. Once the ideas are more fully developed and stabilised, these same colleagues can stimulate and lead the same discussions in schools, with confidence. They can make the ideas more practical and personal so that they are more likely to be considered for action in the school.

Collaborative Enquiry is an Important New Skill

One of the most intriguing findings from this study was the emergence of another new factor that was not anticipated. We have titled this factor "developing capacity for collaborative enquiry" because the items are all connected to professional learning about relationships, collaboration, and enquiry and to collectively challenging each other's assumptions. This scale was related to pupil outcomes at KS4 and has the strongest relationships of the schools scales with changes in thinking and practice.

This factor merges deep collaboration in the form of rigorous and challenging joint work with enquiry (also related to changes in thinking and practice) and is consistent with Little's (2005) reference to a large body of research suggesting that conditions for improving learning and teaching are strengthened when teachers collectively question ineffective teaching routines, examine new conceptions of teaching and learning, find generative means to acknowledge and respond to difference and

conflict, and engage actively in supporting one another's professional growth. The enquiry processes of questioning, reflecting, seeking alternatives, and weighing consequences promote the "transparency" of what otherwise might remain unobservable facets of practice, making tacit knowledge visible and open to scrutiny.

Although enquiry is a key aim of network learning communities and many schools reported being engaged in some form of enquiry, a substantial number of schools were not, with the lowest participation being in activities that involve analysis of data, reflection about initiatives, monitoring initiatives, learning from failed initiatives or drawing on research or evidence for improvement. This suggests that these activities are not valued or that the schools do not have the skills to engage in them.

In our view, it is likely that collaborative enquiry requires developing new ways of thinking, as well as a new knowledge and skills for many teachers and headteachers. This new factor indicates that some participants in these networked learning communities realised that they need to acquire a critical new set of skills in order to work together on serious deep issues that require investigation, reflection and challenging of ideas.

Collaborative enquiry is a mechanism that has the potential to create deep conceptual change and dramatic changes in practice. It includes, by definition, ongoing and challenging engagement with new ideas, rethinking existing beliefs, unlearning past habits and practices, and going through the process of learning how to do things in (sometimes dramatic) new ways. Networked learning communities that foster and develop collaborative enquiry have the potential to facilitate the *dynamic spiral* critical for knowledge creation and sharing that was described by Hakkarainen et al. (2004):

- ***Creating Context:*** Through explicitly creating a context, the issues being investigated are connected with deep principles of the knowledge domain in question, and anchored in authentic, practical, and complex problems of the external world, or issues that the participants generally care about.
- ***Engaging in Question-Driven Enquiry:*** An essential aspect of progressive enquiry is generating one's own problems and questions to guide the enquiry;
- ***Generating Working Theories:*** Construction of their own working theories guides inquirers to systematically use their background knowledge and become aware of their presuppositions.

- ***Critical Evaluation:*** Critical evaluation underscores the need to assess the strengths and weaknesses of the tentative theories (explanations) produced so as to direct and regulate the evolution of enquiry.
- ***Searching for New Information:*** Searching for and working with "research" is necessary for deepening one's understanding. New information can come from literature, consulting experts, or conducting one's own explorations. Explicit comparison of the intuitive working theories with the well-established ones makes the limitations of individual and collective knowledge apparent.
- ***Engagement in Deepening Enquiry:*** A critical condition for progress is a focus on improving ideas by generating more specific questions and searching for new information and generating more questions.
- ***Shared Expertise:*** The agent of knowledge creation is not an isolated individual but an individual embedded in a community, or even the community itself, through socially distributed cognitive resources and collaborative efforts to enhance shared understanding.

This spiral of knowledge creation allows educators to search for and consider both explicit and tacit knowledge with both school and network colleagues in order to investigate practices and ideas through a number of lenses, to put forward hypotheses, to challenge beliefs, and to pose more questions.

The School and Network Foci need to be Right, Shared and Understood

Educational reform is a major policy initiative around the world. This means that schools are constantly being inundated with ideas and mandates all purporting to offer more integrated and differentiated ways to serve pupils. Although many of these innovations have merit and they are often inextricably interconnected, schools and networks have the task of identifying how to position their resources of time and energy to best advantage. Having a clear and agreed focus provides the vision and direction that allows them to protect the space to go deeper, create alignment, build capacity and share what they are learning. Without a defined focus there is always the risk of having the kind of "Christmas tree" schools that Bryk et al. (1998) describe, with many different initiatives but no core compelling ideas to focus the agenda.

The schools indicated that both the school and the network focus was explicit and linked to teaching and learning and to the needs of pupils, although very few said that either focus was displayed for everyone to see. There was only modest agreement that the focus was shared within the school or that it was based on research. Although neither

school nor network focus were associated with pupil outcomes in these data, they were highly correlated with changes in thinking and practice.

When we considered the nature of the focus identified by the networks in their Year 2 Reviews, we found that many of them were vague and addressed broad areas like teaching and learning, pupil engagement or assessment, perhaps without the clarity or shared understanding that would allow them to drive fundamental changes.

A clear, high-leverage and challenging focus is an important feature of networked learning communities when the intent is to mobilise knowledge to improve instruction and increase pupil achievement. Having a clear, visible, yet challenging focus is important for bringing people together to reflect on and rethink their beliefs and their practices and to minimise the clutter of activity in the school or network. The compelling question is "Does this focus provide a space for drawing on new explicit knowledge and research as well as expose the tacit knowledge of the group for deeper consideration? When the focus is vague or not visible, it is possible for everyone to relate to it but for no one to use it to explore what it means for changes in their thinking or their practices.

Formal Leadership Matters

Networked learning, communities, almost by definition, rely on what Rowan (1990) called "network" patterns of control, where leadership activities are distributed across multiple people. Although there has been considerable attention to the role of distributed leadership in networks, a topic that we address in the next section, there is also a continuing role for formal leaders in stimulating vision and focus, providing support (intellectual and instrumental), monitoring development, disseminating information and buffering schools and networks from challenges posed by the larger environment.

In this study we considered the roles of formal leaders (headteachers and deputy headteachers) in their school and in relation to their network through questions about such things as taking responsibility for the improvement process, monitoring progress, providing resources or time for participation in professional activities, and helping the school or network keep its focus when other initiatives are being encouraged.

It is not surprising that formal leadership in the school was associated with pupil outcomes at KS2 and KS4 and also with changes in thinking and practice. There is considerable evidence that school leadership is an important dimension of school effectiveness (Leithwood & Jantzi, 2000; Leithwood, Seashore Louis, Anderson, & Wahlstrom, 2004; Youngs & King, 2002). Formal leaders' involvement in enabling activities in the network also correlated with changes in thinking and practice, which reflects the empirical evidence that formal leaders influence pupil achievement indirectly through the conditions they support in their schools (Witziers, Bosker, & Kruger, 2003). The school culture they foster contributes to the way school colleagues relate to one another professionally, and in this case, also to the network, in order to leverage changes in thinking and practice. This positions school leaders as "boundary spanners" and facilitators of change within the network, both offering a point of upload and download of good ideas and practices between the school and the network, and providing the conditions for boundary spanners to emerge from within the school.

The majority of schools indicated high involvement of formal leaders in all of the supporting activities but this was only true in for formal leaders in relation to the network in about half of the schools. It is likely that the impact of the network could be more intense if formal leaders in schools were more involved in encouraging and motivating others to participate in the network, setting and monitoring the network agenda, spanning the boundary between the network and the school and providing support to allow staff members to be active in network activities.

Distributed Leadership is Important in Schools and Networks

Spillane (2006) makes the case that leadership in schools is not connected to role or position but to activities and practices that are stretched over many people in a system of interactions that is more than the sum of the actions of individuals. This portrayal of distributed leadership allows many people to perform leadership work to influence the core of schooling – teaching and learning.

Informal or distributed leadership in the schools was an important feature in this study, with significant correlations to pupil attainment at KS4 and to changes in thinking and practice. Distributed leadership in the network (i.e., colleagues in the school engaged

in leadership activities in the network) was also correlated with changes in thinking and practice, although the percentage of schools in which colleagues were involved in leadership activities in the network was smaller than the percentage involved in leadership activities in the schools.

The level of distributed leadership within the study schools was encouraging. From 60-85% of the schools were in agreement with all of the questions about informal leadership. In a majority of the schools, colleagues were involved in the kinds of activities that Katzenmeyer and Moller (2001) describe as leading within and beyond the classroom, contributing to a community of teacher, learners and leaders, and influencing others toward improved educational practice. They were involved in coordinating activities in the school, establishing school action plans, providing support, resources and information to colleagues, evaluating school progress and encouraging others to seek advice.

Within networks, colleagues were doing some of the same things, although these activities were reported by fewer than half of the schools and the activities here were more connected to coordinating and focusing activities, and less engaging with or supporting colleagues.

Although distributed leadership has the potential to change thinking and practices and pupil learning in schools, not all schools, and certainly not all networks, were utilising this resource, nor was everyone in the schools engaged in leadership activities. As Spillane (2006) points out there are many conditions that moderate the breadth and depth of distributed leadership (e.g., functions, subject matter, school type and size, developmental stage). Distributed leadership may be a powerful lever for spreading the work of networks, but it requires developing an understanding of how distributed leadership can work within a model of joint work that challenges thinking and practices and collaborative enquiry to focus and deepen how teachers think about and engage in their daily practices to enhance pupil learning.

Pupils and Families are Absent

Although pupils and families were not a central part of this study, the results are striking. Pupils were one of the most involved groups in the networked learning

communities, with 93% of schools indicating that they were involved. However, there is little indication that this involvement was more than superficial. In fact, very few schools said that there had been changes in either the way that they thought about pupils or their families, or changes in their relationships with pupils and families. It appears that pupils are attending network functions and showcase their work but there is little evidence of a fundamental shift in the nature of the relationship of schools with pupils or families.

It is likely that fundamental shifts to the way schools think about the place of pupils and families in school reform and operate to serve all pupils well will involve thinking about the kinds of changes that must occur in relationships and interactions with pupils and their families to support and extend the work of schools.

It is Hard to See the Influence of Networks

We close this chapter as we began it, with a statement about the complexity of networked learning communities and how difficult it is to see their influence. Networks of schools are amorphous; they have many different forms and structures; they engage different people in different ways at different times; and they do not result in any direct products that can be attributed to their work, except the artefacts that move back and forth between the networks and the schools. This means that the work of networks of schools is almost always indirect, evidenced in changes that occur in schools and classrooms removed from the network by time and space. This makes it very hard to establish any direct links.

Even the people who are most knowledgeable about the networks don't always see its influence. This was particularly noticeable in the pattern of "don't know" responses, where they were uncertain about many of the items, especially in relation to the network. In addition, only about 25% of the schools indicated a belief that their involvement in the network was important in influencing pupils' engagement and motivation or in improving practices in the school. Even fewer (about 10%) felt that it was important in improving pupil attainment or pupil behaviour. At the same time, there is evidence from this study that attachment to the network is strongly related to changes in thinking and practice and to pupil learning. This paradox may arise because the respondents did not understand all parts of the web of influence because they were a

number of steps removed from the work so their attribution was made to their closest connection.

Networked learning communities are made up of complex interactions between structures and activities. Each of the features has a role to play, and like any complex system, the ways in which they combine and interact are innumerable and cannot be predicted in any particular context. A change in any one invites changes in the others. Complex systems theory is useful for understanding the workings of networks. A central characteristic of complex adaptive systems is the interdependence of the features, with each one being connected to all of the others. For example, the nature of collaborative enquiry will depend on the quality of relationships; capacity building and support will depend on the kind of the leadership; the power of the enquiry will depend on the focus and purpose. The complexity of the interaction between schools and networks makes it even more important that researchers continue to examine it in myriad ways, to make the inner workings more explicit and transparent so that they can be understood and used by others.

Summary

In this chapter, we have discussed what we believe to be the important learnings from this study. There may be others and there is undoubtedly much more to learn about the nature of the complex interactions among schools within networks and between the network activity and changes in thinking and practice in schools. In the final analysis the critical issue is how pupils experience and utilise what emerges from the construction and sharing of new knowledge by people in schools and the ways that they translate what they are learning into concrete environments and conditions for learning.

Networks of schools may have the potential to disturb the status quo, create the conditions for knowledge creation and stimulate change in the daily work of people in schools, in the service of learning for all pupils. Our interpretation of the results of this study are that networks of schools are likely to be most effective if enhancing pupil learning is the unwavering goal and the work of networks and the schools within them is creating the conditions for educators to engage in the kind of joint work and collaborative enquiry that constantly pushes them to routinely examine and alter what they do in a

spiral of continuous rethinking, refinement and transformation that results in fundamental changes in the way that they think and act in schools in order to provide the best for the pupils that they serve. Relationship of trust and mutual challenge are the links; tapping explicit knowledge and exposing tacit knowledge provide the process and leadership, both formal and distributed, can create the forums and provide the necessary support and capacity-building opportunities to move the processes forward.

Chapter 7 – Implications for Policy, Practice and Research

The findings from this series of studies provide valuable information for future decisions and actions for policy makers, practitioners and researchers. In this chapter we highlight some of the implications that we believe emerge from this work for these three groups. It is important to note that networking schools is a complex activity and all of these issues are related to one another. With this in mind, policy makers, practitioners and researchers need to look at the total picture and the roles that they all must play to move from "tinkering around the edges of educational change" to "deep and sustainable changes in thinking and practice that influence pupil learning". The following implications are a starting point for each group to begin the task of reflecting on their role in utilising networks to create the conditions for the kind of cognitive dissonance and challenges to practice that result in changes in the culture and in the work of schools. In our view, it would be useful for all three groups to dedicate some time to reviewing the findings of this study, in light of their current directions, and strategising about the possible implications that they see for their own work.

Implications for Policy

Networks of various kinds have become standard practice in education in England and are often seen as the panacea for changing schools. But, just networking schools is not the answer. Real change emerges from particular kinds of interactions and activities within the collections of people who work in schools and engage in networks as a way of pushing their thinking and their practices.

Central authorities can embed networked learning communities into government initiatives in ways that give guidance without reducing the flexibility to operate in ways that make sense within the local context. As Fullan (2005) says:

> The role of the centre is to set up the conditions for cultivating and supporting the wisdom of the system …by inviting the system as a whole to engage in the specific adaptive challenge of reaching levels never before achieved.

The goal is to engage the ingenuity at the local level in the service of changing things that are simultaneously important to local communities and to the system as a whole by creating the conditions for change to be stimulated, supported, and deepened over time.

Encouraging New Learning Paradigms for Adults in Schools

Fullan (1991) has often reminded us: "Educational change depends on what teachers do and think - it's as simple and complex as that". In this study, we found that the kind of learning that matters is learning that causes teachers and headteachers to reflect on and challenge their own thinking and practices to ensure that they are engaged in the most profitable use of time and energy. This kind of change is not as easy since it involves individuals reconstructing their mental models and their professional knowledge. Networks have the potential to broaden the range of perspectives and to create forums for enquiry, discussion and challenge that are very difficult to accomplish within schools. The title "networked learning communities" is very apt in this case. Networks of schools should be places of learning, not delivery mechanisms. Policy makers need to consider the best use of networks to ensure that the people closest to the pupils are inspired and supported to be "innovative knowledge workers" (Hargreaves, 2003) and continue to provide the support and the pressure to promote creating new knowledge for teachers and headteachers, as a necessary and sought after dimension of professional practice.

Supporting Formal Leaders

Two of the significant features that emerged from this study were the strength of attachment of the school to their network and the engagement of formal leaders in network activities. This suggests that headteachers are key players in establishing and sustaining the connections and in the interchange of ideas across schools within networks. They are the ones who can engage, motivate and support the staff to move beyond the comfortable status quo; they are the ones who can stimulate and lead collaborative enquiry to enhance professional learning and investigate alternative approaches; and, they are the ones who set and champion the vision even when the changes feel awkward and uncomfortable. However, the study shows that many formal

leaders are not actively involved in network activities. This may be a function of lack of commitment or lack of confidence. If networks are likely to influence practices in schools, it is important that headteachers are motivated, have the skills and are part of a context that encourages their involvement. From a policy perspective, this means supporting activities like training, mentoring and coaching for headteachers and prospective headteachers, so that they are confident and comfortable about their role within their networks of schools, as well as providing incentives to be actively engaged in work with other school leaders and in leading school staff in their quest for new knowledge through network participation.

Building Capacity for Collaborative Enquiry

Changing thinking and practices requires unlearning and challenging existing beliefs and ways of working. This means that schools and networks need to facilitate on-going knowledge creation and sharing among members of the educational community. Collaborative enquiry holds considerable promise as a mechanism for considering tacit knowledge, drawing on explicit knowledge from research and engaging in dialogue to clarify and make meaning out of new ideas and information. As our data suggest, some teachers and headteachers were engaged in developing their skills in collaborative enquiry. However, this set of skills is new and complex and requires time, support and expertise. This is an area that deserves particular attention in CPD for school leaders both formal and informal. Policy makers could provide the wherewithal to hasten the capacity of individuals and groups within schools and networks to engage in this high yield practice.

Engaging Pupils and Families

Another finding from the study has important implications for policy. Every Child Matters is premised on the involvement of parents and families, as well as pupils themselves in ensuring success for all young people. The limited indication in these data that there have been changes in thinking about or relationships with pupils or families in the schools suggests that there is still work to do to create the kinds of engagement of parents, carers and families in their children's education and of pupils' involvement in their own education that will help all young people achieve what they want in life.

Although pupils have participated in network activities, there is considerable scope for policy and for networks to work as catalysts to encourage and model genuine involvement of families and pupils in decisions and processes related to pupils' learning and their future.

Implications for Practice

It was clear from this study that changes in pupil learning are dependent on thoughtful and targeted changes in the thinking and practices of the adults in the schools. Participation in a network of schools provides a broad base of contacts, ideas and challenges that can help stimulate, focus and support these changes. When schools enter networks they should be prepared to bring their energy and their willingness to learn to the collaborative activities in the network and in the school, in anticipation of powerful returns on their investment.

Engagement of Formal Leaders

This study confirms that leaders in schools work as key conduits and supports for networks to influence changes in schools. Formal leaders need to be actively engaged in network activities, not necessarily as network leaders, but by being the symbolic and pragmatic link between the network and the school, by creating opportunities for their staff to do the same and by stimulating and encouraging activities that allow the staff to review and rethink what they believe and what they do.

Distributed Leadership

Harris (2003) indicates that when leadership is considered as part of an interactive process of -making sense and creating meaning, it suggests shared understanding and action within the organization. Leadership is about learning together and constructing meaning and knowledge collectively. Distributed leadership engenders this kind of "stretching" of the activities across many people in the organisation (Spillane, 2006). This does not imply simply assigning new tasks to teachers and calling them leaders. Instead, it involves the actual enactment of leadership tasks within their own roles as teachers. Teachers, as leaders, participate in joint construction of meaning and lead within and beyond the classroom by identifying with and contributing to a community of

teacher learners and leaders, and influencing others toward improved educational practice through motivating, sharing experiences, willingly experimenting with new ideas, and learning with others.

Joint Work that Challenges Thinking and Practices

Sustained changes in thinking and practice happen when teachers and headteachers move beyond comfortable relationships and sharing ideas to work together on projects that compel them to stand back and reserve judgment, make their beliefs and practices transparent and open to scrutiny and participate in collaborative enquiry that either reinforces their perspectives or replaces them with higher leverage alternatives. In schools, collaborative enquiry that involves problem identification, considering evidence from internal and external sources, and coming to some shared image of professional knowledge that they can test and refine in their practices, should become a typical way of operating as a learning community. For networks, this means having headteachers and teachers actively engaged in the work of the networks and coming into contact with diversity of opinion, enquiry and a range of alternative approaches that are compelling enough to stimulate collaborative enquiry and changes in the way they think and act in schools. Networks need to be places where the adults are comfortable with challenge, with diverse perspectives, with the exploration of new ideas, with ambiguity, and with frustration, in the service of new learning.

Compelling Ideas With High Leverage

A clear vision and focus on learning is one of the significant features of networked learning communities. Not all foci are equally worthwhile, however, and some are relevant in some contexts but not in others. It is important that schools and networks focus on compelling ideas that stretch their capacity and "ratchet up" the effects of schooling. High leverage innovations are ones where there is evidence that they can make a difference for pupils and that they are consistent with the needs of the particular context.

Choosing a high leverage focus involves a careful analysis of the context and needs within the network, finding out what innovations are worth considering and how well they have worked elsewhere, and monitoring progress regularly to see what (if

anything) needs attention. David Hargreaves (2003) describes this process as "disciplined innovation" – the continuing identification of high leverage best practices and in-depth interaction conducive to transferring best ideas into practice.

Implications for Research

This study brings together some powerful data sets related to schools, networks of schools and pupil attainment and provides insights into the working of schools within networked learning communities. However, there is still much to be learned. It is our hope that this work will stimulate others to continue their investigations and that we will engage with many of the international experts who have been part of the work along the way to undertake additional analyses of the data to investigate more topics more fully.

The following are only a few of the possibilities for additional research:

- Because all of the constructs in the theory of action are associated with each other, it is difficult to disentangle the key features to isolate ones that are essential from the others. It would be interesting to use the same conceptual framework to gather qualitative data from schools in a selected sample of networks that are particularly strong in some of the key features to see how they work on the ground.
- There were differences in perceptions of engagement and impact between schools with respect to the network and some uncertainty about the level of knowledge on the part of some respondents. Further study of schools with reported high levels of engagement with the network and that had promising results (improvements over 2003-2005) would help to illuminate good practice and could inform the further development of networks of schools.
- Even though the data collection team went to incredible efforts to encourage responses, the response rate was disappointing. In our view, this may be a function of the conceptual difficulty in responding to the questions, especially in relation to the network and how it relates to the school. An in-depth study of key people within schools to determine their perceptions, knowledge base and actual involvement in the network and how it influenced them would provide another kind of understanding.
- There are many other networks of schools in England and elsewhere, in which the survey constructed for this study could be used to glean additional insights from a comparative vantage point.

Summary

These implications are not the only ones that can be drawn from this study and we encourage readers to consider the findings themselves to determine other possible

implications and issues for attention. We hope that this report and the rich data set on which it is based will stimulate the kind of conversations and debates about networks of schools that will contribute to deeper understanding about how the collective learning or adults in schools and educational systems can make schools better places for pupil learning.

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How Networked Learning Communities Work

Volume 2 – The Appendices

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Appendix B – Methodology For Phase 3

Phase 3 of the Aporia investigation was a large-scale quantitative study designed to test the model that was developed in Phase 2 using:

- a carefully constructed survey instrument was designed using the theoretical framework from Phase 2 to assess the theory of action (the enablers, the extent and nature of knowledge creation and sharing, and changes in thinking and practice, as well as the degree of attachment to the network).
- measures of student achievement

This phase of the study was a collaborative effort in which Aporia coordinated the study, developed and piloted the survey instrument, identified the sampling procedure, specified the analysis requirements interpreted the results and wrote the final report. The Networked Learning Group took responsibility for distribution and receipt of the surveys and preparation of a comprehensive data set through an independent supplier and for analysis by external researchers[1].

Development of the survey instrument

The research instrument was developed with consideration not only to the individual key features identified in the Theory of Action, but to the theorized interaction between such features both within schools and from school to network. The survey was designed using dimensions and operational definitions to identify the items for measurement in the various literatures. The following table gives the dimensions that were developed from the literature as important elements within each of the Key Features.

Key Features	***Dimensions***
Purpose and Focus	For teaching and learning
	Shared commitment (motivating, compelling)
	High leverage (evidence-based)
	Inclusion of community in the process of creation
	Contextually relevant
	Explicit
Relationships	Common language
	Channels for communication and dissemination
	Awareness of others' expertise
	Shared responsibility – division of labour
	Shared responsibility – for success of others (on behalf of)

[1] Professor Pam Sammons, University of Nottingham and Tamjid Mujtaba, Institute of Education, University of London

	Trust
	Who (categories or groups)
Collaboration	Depth
	Purposeful in seeking contact
	Problem solving
	Examining practices
	Making practice explicit
	Recognition of need for conflict and living with ambiguity
	Focused on issues of curriculum learning and teaching
Enquiry	Problematising issues – challenging beliefs
	Collaborative activity – conversations that involve scrutiny and challenge
	Systematic and intentional exploration of information (using data)
	Appeal to research, experts, each other
	Culture of Enquiry - habitual
	Consider multiple perspectives
Leadership	Distributed leadership – broad based
	Establishing a vision
	Coordinating
	Mediating or buffering challenges
	Providing instrumental support
	Monitoring
	Empowering and engaging others
	Sharing expertise
	Disseminating or sharing information
Accountability	Self monitoring and adjustment
	Public statements of account
	Transparency in sharing information with the public
Building Capacity and Support	Focus on professional learning
	Conditions to foster all of the other features

We began with scales related to the Dimensions that already exist in the literature that contained evidence of reliability and validity to construct an item bank of 482 items from 16 surveys as a basis for developing a survey for piloting. Surveys were investigated until we reached saturation and items were repeated across surveys. The items were grouped by content and the most appropriate item was selected or a composite item was created to represent the idea. All items were rewritten into a similar format.

In developing the items, a decision was required about whether to measure respondents' determination of quality versus quantity around key features. For example, in considering aspects of collaboration, the team recognized that there was a difference in asking about quality (or depth) of collaboration (e.g., How *well* do your colleagues collaborate?) versus quantity (or breadth) of collaboration (e.g., How *many* of your

colleagues collaborate?). The number of key features to be investigated across both school and network contexts and the subsequent length of the survey did not allow for consideration of both dimensions. Turning to the theory of action underpinning the development of the instrument, the team decided upon scales that focused on quantity of interactions.

Where possible, a parallel structure for school and network questions was used. It was hoped that this structuring of the items would assist participants in differentiating their responses for identical questions between colleagues' school experiences and network experiences.

Goddard et al. (2004) argue that when the unit of interest is institutional – in our case, the school - aggregating individual perceptions of group capability is preferable to a) aggregating individual perceptions of self capabilities and b) asking group members to discuss their group capabilities and come to consensus. The two latter strategies are far more susceptible to social desirability biases than the former, not to mention logistically problematic. They go on to offer evidence that individual perceptions of group functioning yield more variability between groups (schools), which is desirable from a methodological point of view. Our approach, then, was to ask individuals within schools to respond to group ("we" or "teachers in this school") rather than self ("I") referent statements on a survey.

The initial survey instrument included 232 items:

- Demographic questions – 4 items
- Purpose & Focus (11 items with network parallel) – 22 items
- Relationships (12 items with network parallel) – 24 items
- Collaboration (22 items with network parallel) – 44 items
- Enquiry (11 items with network parallel) – 22 items
- Leadership (16 items with network parallel) – 32 items
- Accountability (6 items with network parallel) – 12 items
- Building Capacity (2 items with network parallel) – 4 items
- Formal Leadership (21 items with network parallel) – 42 items
- Changes in Thinking (12 items with no network parallel) – 12 items
- Changes in Practice (7 items with no network parallel) – 7 items
- Attachment to the Network (7 items with no school parallel) – 7 items

Piloting the Survey

Five surveys were sent to each of the 205 schools participating in the Network of Performance Based Schools in British Columbia. Each school leader was asked to select five colleagues (possibly including themselves) to complete the survey. Participants were

selected based on their ability to knowledgeably answer questions about network activities in their school. A total of 1025 surveys were mailed out to schools participating in the NPBS. Prior to the survey mail out, the NPBS central leaders sent an email to network leaders requesting each school's participation in the study and explaining the importance for program improvement. Two reminder email messages were sent to the network leaders, one upon receipt of the surveys, and one prior to the return date. 72 schools sent back surveys, with an average of 3.2 completed surveys per school. This represents a 35% school-level response rate.

Analysis of the Pilot Data

Feedback from the pilot revealed that participants' difficulty in working with the school to network distinction, and their discomfort in answering on behalf of their colleagues. Likewise, feedback revealed inconsistencies in respondents' understanding of the quality/depth and quantity/breadth dilemma.

The survey data analysis included descriptive data on the scales, correlations of key features to intermediate outcomes, network association and network influence. In addition, *t*-tests were performed to compare the various measures between schools with high and low association with the network.

Table 1: Respondent-Level Descriptive Statistics and Reliabilities for the Scales

	Number of Items	Number of Valid Responses	*M*	*SD*	Cronbach's Alpha	Mean % DK
School-level						
Purpose and Focus	5	225	4.35	0.50	0.70	2
Relationships	11	220	4.01	0.54	0.90	2
Collaboration	22	218	3.61	0.58	0.94	5
Enquiry	11	207	3.37	0.69	0.92	10
Distributed Leadership	16	212	3.49	0.65	0.94	8
Accountability	6	216	3.47	0.85	0.85	8
Building Capacity	2	214	3.78	0.80	0.64	7
Formal Leadership	21	210	4.12	0.62	0.95	4
Network-Level						
Purpose and Focus	6	214	4.25	0.51	0.74	6
Relationships	11	160	4.08	0.66	0.92	18
Collaboration	22	155	3.93	0.68	0.95	25

Enquiry	11	148	3.84	0.77	0.92	26
Distributed Leadership	16	150	3.84	0.71	0.94	28
Accountability	6	153	3.81	0.85	0.84	26
Building Capacity	2	153	4.10	0.76	0.72	26
Formal Leadership	21	150	4.18	0.68	0.96	23
Intermediate Outcomes & Network Affiliation						
Changes in Thinking	12	196	3.37	0.79	0.96	14
Changes in Practice	7	188	3.26	0.86	0.94	15
Attachment to Network	1	194	3.12	1.00	na	4
Network Influence	6	200	2.97	0.61	0.92	8

Table 1 shows descriptive data about the scales. The number of valid responses is lower for the network items than the school items. Scale scores were computed only when respondents had answered half or more of the items using the 4 or 5 point scale. Respondents who did not use the scale to respond could either skip the item or mark it 'DK'. An examination of item-level responses reveals that respondents were relatively more likely to mark DK than skip on the school items, about equally likely to mark DK as to skip on the network items and more likely to do one or the other on network than school items. The mean percentage of 'DK' responses to the items in each subscale is much higher for the network items than others. Although they appeared at the end of the survey, the intermediate outcomes and network adherence measures had relatively high response rates. In summary, between 83% and 99% of respondents were assigned valid scale scores for school, intermediate outcome and network importance scales, while 66% to 94% of respondents had valid scores for network items.

Means on the scales were high. All were above the mid-point of 3. For the key features, the highest means were for Purpose and Focus both for network and school. The lowest were Enquiry, Distributed Leadership and Accountability for school and network. For most Key Features, means were slightly higher for the network than school measures. Mean responses to the intermediate outcomes and attachment to the network were low in comparison, with the single-item measure of network attachment the lowest of all measures. On the other hand the mean response of 2.97 to the 6 items measuring perceived influence of the network on the school was relatively high on the 4-point scale. Cronbach's alpha, a measure of the internal consistency of items making up each scale, was satisfactory or high with the exception of the Building Capacity scales, which had only two items.

Table 2: School-Level Correlations between Key Features, Intermediate Outcomes and Network Affiliation Measures

	Changes in Thinking		Changes in Practice		Attachment to Network		Influence of Network	
School								
Purpose & Focus	0.37	**	0.37	**	0.28	*	0.29	*
Relationships	0.35	**	0.32	**	0.19		0.18	
Collaboration	0.40	***	0.38	***	0.30	*	0.27	*
Enquiry	0.50	***	0.49	***	0.32	**	0.35	**
Distributed Leadership	0.49	***	0.49	***	0.43	***	0.41	***
Accountability	0.37	**	0.35	**	0.30	**	0.32	**
Building Capacity	0.39	***	0.37	**	0.52	***	0.35	**
Formal Leadership	0.41	***	0.43	***	0.24	*	0.36	**
Network								
Purpose & Focus	0.45	***	0.43	***	0.48	***	0.47	***
Relationships	0.30	*	0.08		0.15		0.19	
Collaboration	0.25	*	0.04		-0.05		0.12	
Enquiry	0.35	***	0.17		0.06		0.27	*
Distributed Leadership	0.24		0.06		0.08		0.27	*
Accountability	0.10		-0.06		0.09		0.22	
Building Capacity	0.23		0.05		0.08		0.26	*
Formal Leadership	0.23		0.17		0.11		0.22	

* p<.05 ** p<.01 *** p>.001 (2-tailed)
Note: the number of schools varied from 62 to 71.

The remainder of the data analysis was carried out on a data file aggregated to the level of the school. Table 2 shows school-level correlations between the school and network key features and the intermediate outcomes and network affiliation. It is evident that correlations are higher overall for the school scales. However, the importance of network Purpose and Focus is evident, and of Enquiry to Changes in Thinking. All of the school Key Features contribute to Changes in Thinking and Changes in Practice. Schools with higher scores on school Enquiry, Distributed Leadership, Accountability and Building Capacity tend to have higher self-perceived attachment to the network. The same variables, along with Formal Leadership are associated with higher perceived influence of the network on the school.

To assess the importance of and high association with the network as reported by network leaders, *t*-tests were used. Table 3 shows the means on all scores of the two

groups. That the intermediate outcome and network affiliation measures are significantly different between the two groups of schools validates the survey measures of these constructs. That school Collaboration and Enquiry and network Purpose and Focus, Collaboration, and Formal Leadership are significantly different may give clues to the ways in which networks in general and this network in particular have their effects.

Table 3: Descriptive statistics by Level of Association with the Network

	Network Association				
	Low		High		
	M	*SD*	*M*	*SD*	
School					
Purpose & Focus	4.29	0.30	4.43	0.42	
Relationships	3.94	0.30	4.09	0.50	
Collaboration	3.45	0.36	3.74	0.51	*
Enquiry	3.15	0.50	3.54	0.64	**
Distributed Leadership	3.43	0.47	3.58	0.62	
Accountability	3.36	0.66	3.57	0.76	
Building Capacity	3.64	0.58	3.90	0.65	
Formal Leadership	4.02	0.45	4.22	0.49	
Network					
Purpose & Focus	4.03	0.47	4.29	0.36	**
Relationships	3.74	0.71	4.06	0.60	
Collaboration	3.62	0.72	3.94	0.58	*
Enquiry	3.58	0.76	3.88	0.64	
Distributed Leadership	3.78	0.60	3.77	0.68	
Accountability	3.75	0.75	3.72	0.80	
Building Capacity	3.97	0.53	4.07	0.75	
Formal Leadership	4.00	0.52	4.25	0.47	*
Intermediate Outcomes					
Changes in Practice	3.05	0.70	3.53	0.54	**
Changes in Thinking	2.93	0.74	3.46	0.63	**
Network Affiliation					
Network Attachment	2.64	0.89	3.21	0.81	**
Network Influence	2.78	0.47	3.03	0.45	*

*p <.05 ** p<.01

Revisions to Survey

As a result of the feedback and analysis of the responses, changes were made to the survey design, the formatting of the items, and the item stems. Some of the interactions of the constructs were also modified in the second iteration of the instrument, and the survey was reduced to 148 items.

The revised instrument format was as follows:

NCSL Survey – 148 items

- Demographic questions – 4 items
- School Based Questions
  - Purpose & Focus – 5 items
  - Relationships – 8 items
  - Collaboration – 16 items
  - Enquiry – 9 items
  - Formal Leadership – 13 items
  - Informal Leadership – 9 items
- Network Related Questions
  - Focus – 7 items
  - Relationships – 8 items
  - Collaboration – 15 items
  - Enquiry – 8 items
  - Informal Leadership – 7 items
  - Formal Leadership – 9 items
- Attachment to the Network – 7 items
- Changes in the Thinking – 11 items
- Changes in Practice – 7 items
- Influence of Networked Learning – 6 items

Distribution and Receipt of the NCSL Survey

In December of 2005 surveys were sent to all schools in a randomly selected 50% of cohort 1 networks within the Networked Learning Communities (60 networks were invited to participate and 57 agreed). Surveys were sent to each of 662 schools for a total of 3330 surveys distributed[2], with instructions to return between 1-5 surveys, dependent on the number of full-time equivalent teachers working in the school (1 survey if 1-3 teachers; 2 surveys if 4-9 teachers; 5 surveys if 10+ teachers). Each participating school received:

- a covering letter of instructions from Aporia
- 5 copies of the survey
- 5 copies of "Evaluating the Networked Learning Communities Programme (Appendix E)
- 5 x A5 envelopes with printed instruction strapline
- 1 x A4 business reply envelope

[2] Distribution, receipt and data entry were done by Mailcom, a specialist mailing house in Milton Keynes.

Each survey was identified with a unique reference number that originated from the school identification number and a series of numbers applied by Mailcom to allow the surveys to anonymous but allow for accurate recording of schools returning surveys.

The NLG Operations Team designed a systematic communications plan to maximize the response rate. This included contacting the lead contacts of the networks to encourage them to take an active role in ensuring that the schools within their network understood the significance of the survey and the importance of contributing their responses and ongoing contact, through e-mails and telephone conversations, with a named individual in each school who took responsibility for distribution and collection of the surveys. A helpline and an e-mail address were set up and published in each of the letters to address any questions with the process. Schools were given one month to complete and return their surveys. Each school that participated in the survey received a thank you card from NCSL and Aporia, as well as copies of *International Perspectives On Networked Learning Communities,* a booklet that was published from Phase 1 of the Aporia study.

The following table details the completed surveys returned.

Survey Returns

# of surveys returned	1267
% of surveys returned	38%
Average % of schools participating in a network	57%
# of schools returning at least 1 survey	365
% of schools returning at least 1 survey	55%

When the NLG Operations Team followed up with schools to determine the reasons for non-completion, there were a range of reasons, including – changes within network or school; survey too long; OfSTED inspections at the same time; confusing directives about doing surveys; poor communications.

Appendix C – Understanding Network Learning Communities: A Survey for Schools (with percentages)

Appendix D - Analysis Of Phase 3 Data

The Networked Learning Group contracted with Professor Pam Sammons of Nottingham University to undertake initial analysis of the data from the survey and linking it with outcome data from the Key Stage Assessments. Additional analyses were performed by Aporia Consulting Ltd. This appendix describes the analysis process.

Data Preparation

The data were carefully entered from the survey forms to Excel files and from there to SPSS. Re-keying methods were used to ensure accurate entry. Careful data description procedures using SPSS checked and corrected for out-of-range and implausible values.

Descriptive Statistics

Frequencies of response to all items appear on the Questionnaire (Appendix C). The considerable amount of 'DK' responses is of concern. The mean percent of 'DK' and skipped items in each section is shown in Table 1.

Item-Level Analysis

The questionnaire was divided into sections, most of which corresponded to an underlying construct, namely the key enablers described in the body of the report. Below is an analysis which shows several results. First was internal consistency analysis producing Cronbach's alpha for each scale. Scales were formed using the mean item response, with the requirement that half of the items must be answered for the response to be valid. Descriptive results are shown in Table 1. The average percent of respondents who chose the 'DK' option over the items forming each scale is also shown.

Internal consistency analyses using Cronbach's alpha were carried out for the sets of items designed to measure the key enablers described in the body of the report. All reliability coefficients but one were high, the exception being school Purpose and Focus, acceptable at .70.

Factor Analysis was also conducted to identify independent item clusters. The method used was Principal Components Analysis followed by Varimax rotation. The items were run in two sets: sections B, C, D, E, F,G, O and P for school-related and sections H, I, J, K, L, M, N, and Q for Network-Related activities. The analyses were run in two stages. Items that loaded at less than .445 were dropped from the second stage. Eight factors were kept from each analysis, all with eigenvalues greater than 1. The eight school focus factors explained 67% of the variance and the eight network factors 69% of the variance. Because of the extensive missing data, half or fewer of the cases were used in these analyses, 673 and 587 for school and network respectively.

Variables corresponding to the factors were computed, using the mean item response and the pattern of weights on the rotated factor solutions. No substitution for missing data was made. Internal consistency analyses were also run on the items in the scales as identified by factor analysis. Table 2 shows descriptive statistics and Cronbach's alpha for these scales. These scales were used for the bulk of the remaining analyses.

Missing Data

Because of the relatively large use of the 'DK' response, further analyses were run to explore the correlates of the number of questions a respondent skipped (usually 1 to 2% per question) or answered DK. Scores were formed simply by counting the number of DK or skipped responses to the school, network, network affiliation and outcomes section. These scores were then analyzed like other variables.

Four ‘DK’ scales were constructed to reflect the number of DK or skipped responses in the school, network, intermediate outcome and network affiliation parts of the questionnaire.

The scales were then correlated to the factor scales. Detailed results will not be presented. All the correlations were negative and rather small. Two of the larger correlations were -.22 between network DK and School Professional Learning, and of -.21 between intermediate outcome DK and Influence of the network on the school. These correlations are modest, but indicate that non-response was related to less positive responses on other items which were answered by respondents.

In addition, the DK scales were analyzed by school role of the respondent using one-way ANOVA. The results are shown in Table 3. The Headteacher and Deputy headteachers answered DK less than other positions to all question types, while Assistant Teachers answered DK most often. Teachers and those in the ‘Other’ category were between these extremes. It is reasonable to explain non-response by Assistant Teachers, since they probably had relatively little knowledge of the schools they were in. Heads, on the other hand, would be expected to have the most. Thus this finding is not unexpected, but reaffirms that those who answered DK were probably being truthful.

Table 1: Respondent-Level Descriptive Statistics and Reliabilities for the Key Enabler Scales

Constructs	Number of Items	Number of Valid Responses	*M*	*SD*	Alpha	Mean % DK[b]
School-level						
Purpose and Focus	4	1225	4.97	0.71	.70	4
Relationships	7	1253	5.05	0.64	.89	1
Collaboration	15	1260	5.06	0.59	.93	1
Enquiry	8	1228	4.64	0.68	.90	2
Formal Leadership	13	1242	5.09	0.64	.94	1
Informal Leadership	8	1244	4.97	0.61	.90	1
Building Capacity	5	1189	4.68	0.77	.81	6
Network-Level						
Purpose and Focus	6	1188	4.89	0.76	.85	8
Relationships	7	1190	4.56	0.85	.94	6
Collaboration	14	1159	4.34	0.86	.95	9
Enquiry	7	1101	4.32	0.90	.93	12
Informal Leadership	5	1099	4.43	0.99	.92	13
Formal Leadership	9	1135	4.69	0.85	.94	10
Building Capacity	4	1157	4.44	0.94	.84	13
Intermediate Outcomes & Network Affiliation						
Network Attachment	6	1167	3.04	0.62	.91	7
Changes in Thinking	11	1161	3.43	0.79	.96	9
Changes in Practice	7	1183	3.38	0.84	.94	9
Network Importance[c]	6	1191	2.98	0.68	.94	7

[a] The number of valid responses to the scale is the number of respondents who answered half or more of the items.

[b] The mean percentage DK shows the mean percentage of respondents who checked the DK option, over the items in each scale.

[c] The Network Importance scale has 4 options; consequently the mean is not comparable to the other scales.

Table 2: Respondent-Level Descriptive Statistics and Reliabilities for the Factor Scales

Constructs	Number of Items	Number of Complete Responses[a]	*M*	*SD*	Alpha[b]
School-Level					
Changes thinking & practice	18	837	3.47	0.78	.972
Formal leadership	13	1135	5.11	0.63	.943
Relationships & Collaboration	11	1219	5.20	0.60	.941
Enquiry	7	1151	4.71	0.69	.891
Informal leadership	9	1117	4.98	0.60	.908
Purpose and focus	6	1080	5.03	0.64	.827
Professional learning	4	1037	4.51	0.82	.822
Rigorous joint work	5	1190	4.98	0.67	.836
Network-Level					
Network influence	12	896	3.02	0.63	.951
Formal leadership	9	926	4.76	0.83	.940
Teacher collaboration	8	885	4.10	1.00	.930
Network relationships	8	1028	4.60	0.82	.941
Sharing practice	7	1044	4.67	0.79	.930
Network enquiry	7	908	4.33	0.95	.936
Network focus	7	983	4.96	0.71	.886
Informal leadership	4	980	4.53	1.01	.916

[a] All items must have been answered for the scale score to be complete.
[b] The standardized alpha is reported.

Table 3: Missing Responses by School Position

	School Position	*N*	*M*	*SD*	*F(4,1218)*
Missing on School Items	1 Headteacher	227	1.05	4.20	7.33
	2 Deputy headteacher	194	0.81	3.02	
	3 Teacher	626	1.99	4.74	
	4 Assistant teacher	54	3.57	5.58	
	5 Other	122	2.81	6.37	
Missing on Network Items	1 Headteacher	227	2.05	5.70	17.49
	2 Deputy headteacher	194	3.73	8.97	
	3 Teacher	626	8.04	12.70	
	4 Assistant teacher	54	10.19	10.55	
	5 Other	122	8.24	12.63	
Missing on Network Affiliation Items	1 Headteacher	227	0.09	0.69	17.21
	2 Deputy headteacher	194	0.25	0.96	
	3 Teacher	626	0.93	1.90	
	4 Assistant teacher	54	1.24	1.87	
	5 Other	122	0.93	1.92	
Missing on Change Items	1 Headteacher	227	0.89	2.99	10.01
	2 Deputy headteacher	194	1.65	4.50	
	3 Teacher	626	3.07	5.64	
	4 Assistant teacher	54	3.50	5.43	
	5 Other	122	3.33	6.52	

All tests are significant at <.001.

School-Level Descriptive Statistics and Correlations

This section contains a brief description of methods used to calculate school-level descriptive statistics, selected school-level descriptive statistics and correlations.

The data in this study were collected at the individual level, while the thrust of the research questions was at the school level. Thus it was necessary to form school-level item summaries and composite variables. Two different methods were used.

To present the data as estimated percentage responses of schools required two steps. First, percentages of respondents within each school who chose each response to each item were calculated. Possible responses were 1 to 4, 5 or 6 depending on the item as well as 'Don't Know' and blank/incomplete. Then overall means were taken of the within-school percentages to represent the mean overall response of schools in the sample for each item. Estimated school-level percentage responses to most items are presented both in the body of the report and for all items in Appendix C.

For the purposes of describing the central tendency of individual items and composites, the mean item response method was used. . This work was carried out by the research team in England. Blank, incomplete or 'Don't Know' responses were set to missing. School-level summary variables were then formed by taking the mean of the variable (whether item or composite) using all information available within the school. Nonetheless, some schools had no valid responses for some constructs. For the 362 schools in the study, only 299 had valid data for all the constructs summarized in Table 2. Note that most items in the survey had 6 response items, while some had 4 or 5 as indicated in Table 2.

Table 4. Descriptive Statistics for School and Network Level Factors and Variables

	N	*Mean*	*SD*
School-level Constructs			
Changes in Thinking and Practice[a]	323	3.40	0.67
Formal Leadership	358	5.09	0.50
Relationships and Collaboration	361	5.20	0.47
Enquiry	354	4.68	0.53
Distributed Leadership	351	4.96	0.49
Focus	353	4.99	0.52
Professional Learning	352	4.46	0.63
Rigorous and Challenging Joint Work	356	4.95	0.52
Aware of Others' Expertise in This School (Item C2)	362	5.13	0.65
Share Work on School Projects (C3)	361	4.86	0.71
Network-level Constructs			
Network Influence[b]	339	2.97	0.54
Formal Leadership	342	4.69	0.71
Network Collaboration	341	4.01	0.81
Network Relationships	350	4.56	0.65
Rigorous and Challenging Joint Work	348	4.64	0.62
Enquiry	344	4.29	0.75
Focus	348	4.91	0.56
Distributed Leadership	345	4.47	0.80
Challenging one another's ideas in the network (K1)	350	4.17	0.82
Sharing network information with parents and public (L5)	348	3.99	0.98
Network professional learning in leadership (L6)	349	4.32	0.93

[a] Items had 5 response options.
[b] Items had 4 response options.

Table 5. Inter-correlations of School Factors and Items

		1	2	3	4	5	6	7	8	9	10
1	Changes in thinking & practice	1									
2	Formal leadership	0.32	1								
3	Relationships & Collaboration	0.29	0.67	1							
4	Enquiry	0.35	0.69	0.75	1						
5	Distributed leadership	0.42	0.80	0.67	0.70	1					
6	Focus	0.40	0.67	0.59	0.60	0.61	1				
7	Professional learning	0.44	0.58	0.60	0.70	0.64	0.53	1			
8	Enquiry-based joint work that challenges thinking and practices	0.31	0.67	0.78	0.74	0.67	0.53	0.63	1		
9	Colleagues active in network	0.48	0.29	0.31	0.25	0.31	0.33	0.27	0.31	1	
10	Aware of others' expertise in school	0.26	0.49	0.62	0.53	0.51	0.53	0.43	0.49	0.32	1
11	Share work on school projects	0.33	0.53	0.59	0.55	0.54	0.52	0.49	0.55	0.30	0.57

Note: all correlations are significant with $p < .001$. Pair-wise deletion of missing cases was used.

Table 6. Inter-correlations of Network Factors and Items

		1	2	3	4	5	6	7	8	9	10
1	Network influence	1									
2	Formal leadership	0.64	1								
3	Network collaboration	0.52	0.55	1							
4	Network relationships	0.60	0.68	0.61	1						
5	Enquiry-based joint work that challenges thinking and practices	0.56	0.69	0.71	0.71	1					
6	Enquiry	0.62	0.66	0.72	0.66	0.72	1				
7	Focus	0.56	0.61	0.42	0.58	0.53	0.54	1			
8	Distributed leadership	0.59	0.69	0.59	0.66	0.66	0.66	0.57	1		
9	Challenge Network Colleagues	0.59	0.54	0.64	0.54	0.60	0.71	0.43	0.51	1	
10	Share Network Information	0.57	0.62	0.63	0.63	0.61	0.64	0.52	0.71	0.54	1
11	Network PD on Leadership	0.56	0.64	0.50	0.60	0.48	0.60	0.50	0.65	0.44	0.63

Note: all correlations are significant with $p < .001$. Pair-wise deletion of missing cases was used.

Table 7. Correlations of Network and School Measures

	Network Influence	Formal Leadership	Network collaboration	Network relationships	Enquiry-based joint work that challenges thinking and practices	Enquiry	Focus	Distributed leadership	Challenge Network Colleagues	Share Network Information	Network PD on Leadership
Changes in thinking & practice	0.75	0.51	0.38	0.47	0.40	0.48	0.52	0.47	0.45	0.48	0.50
Formal leadership	0.31	0.54	0.25	0.46	0.42	0.33	0.48	0.35	0.26	0.41	0.34
Relationships & Collaboration	0.27	0.47	0.25	0.37	0.38	0.35	0.42	0.33	0.24	0.34	0.29
Enquiry	0.35	0.52	0.36	0.45	0.44	0.48	0.41	0.38	0.39	0.42	0.37
Distributed leadership	0.36	0.57	0.34	0.51	0.46	0.42	0.42	0.41	0.32	0.44	0.37
Focus	0.36	0.46	0.27	0.44	0.36	0.33	0.53	0.34	0.25	0.40	0.33
Professional learning	0.38	0.46	0.34	0.47	0.39	0.44	0.37	0.35	0.41	0.46	0.47
Enquiry-based joint work that challenges thinking and practices	0.22	0.45	0.29	0.38	0.36	0.36	0.37	0.33	0.26	0.38	0.29
Colleagues active in network	0.37	0.34	0.18	0.20	0.14	0.19	0.33	0.24	0.20	0.28	0.21
Aware of others' expertise in this school	0.23	0.38	0.20	0.29	0.29	0.22	0.34	0.27	0.14	0.30	0.22

Share work on school projects	0.29	0.36	0.24	0.36	0.30	0.27	0.33	0.27	0.20	0.32	0.23

Note: all correlations but those mentioned are significant at $p<.001$. The correlations of Colleagues active in the network with Rigorous Challenging Joint Work and Aware of Others' Expertise with Challenge Network Colleagues are significant at $p<.01$.

Results of Two Multiple Regression Models

Two multiple regression models were run with the dependent variables Changes in Thinking and Practice for one and Network Influence for the other. The predictor variables were the same for both. These two outcome variables were highly correlated at .75.

The predictor variables were the remaining school factors, two variables measuring network attachment, and the remaining network factors. The variables were entered stepwise, in stages. At the first stage the school factors were entered, at the next the network attachment variables and finally the network factors were entered. Tables 8 and 9 below show the results at the end of each stage. The tables show which of the school factors entered, which of the network attachment variables entered and how that affected the significance of the school factors, and finally which of the network factors entered and how the significance of previous predictors was affected. It should be noted that the predictor variables are moderately to highly inter-correlated.

Table 8 shows the results of the model to predict Changes in Thinking and Practice. Using the stepwise method of entry, the most predictive variable enters first, followed by the next predictive and so on. Entry by stages allows a new process of stepping through the variables with each stage. We see that at Stage 1, two factors Professional Learning and School Focus entered the model. At Stage 2, both measures of network attachment entered, but School Focus lost significant predictive power. At Stage 3, Network Focus and Enquiry entered and the variable Attachment to the Network became non-significant. The model as a whole was highly significant, and explained 42% of the variance.

Table 9 shows the results of the second regression predicting Network Influence. The same two variables entered the model at stage 1, but at stage 2 both of these school factors lost significance when the two measures of network attachment entered the model. At stage 3, Network Focus, Network Enquiry and Network Formal Leadership entered the model and none of the previously entered predictors lost significance. The model was highly significant and explained 51% of the variance.

Thus although Changes in Thinking and Practice and Network Influence are highly correlated, the pattern of significant predictors is somewhat different. The significant predictors of Network Influence are network attachment and the three network factors with no significant school factors. For Changes in Thinking and Practice the school-level Professional Development factor is significant and Network Attachment and Network Formal Leadership are not.

Due to the high inter-correlations of the set of predictor variables, results of these analyses should be interpreted with caution.

Table 8. Results of a Multiple Regression Predicting Changes in Thinking and Practice

		Standardized Beta		R Square	Model F[a]
Add School Factors	Professional learning	0.32	***		
	Purpose and focus	0.21	***	0.23	F(2,297)=43.09
Add Network Attachment	Professional learning	0.23	***		
	School focus	0.09			
	Number of colleagues active In network	0.30	***		
	Attachment of School to Network	0.21	***	0.36	F(4,295)=41.81
Add Network Factors	Professional learning	0.19	***		
	School focus	-0.04			
	Number of colleagues active in network	0.30	***		
	Attachment of School to Network	0.05			
	Network focus	0.23	***		
	Network enquiry	0.17	**	0.42	F(6,293)=35.75

** p<.01 *** p<.001

[a] All F tests for the model are significant at a probability <.001.

Table 9. Results of a Multiple Regression Predicting Network Influence

		Standardized Beta		R Square	Model F[a]
School Factors	Professional learning	0.26	***		
	School Focus	0.21	***	0.17	F(2,309)=31.06
Add Network Attachment	Professional learning	0.11			
	School Focus	0.08			
	Attachment of School to Network	0.46	***		
	Number of colleagues active in network	0.14	**	0.39	F(4,307)=48.24
Add Network Factors	Professional learning	0.05			
	School Focus	-0.08			
	Attachment of School to Network	0.21	***		
	Number of colleagues active in network	0.12	**		
	Network Enquiry	0.23	***		
	Network Focus	0.23	***		
	Network Formal leadership	0.16	*	0.51	F(7,304)=44.87

* p<.05 ** p<.01 *** p<.001

[a] All F tests for the model are significant at a probability <.001.

Appendix E - Sammons & Mujtaba (2006) Understanding Networked Learning Communities: Analysis of A Survey for Schools - Executive Summary[3]

Education Networks have become popular because they encourage and support many of the key ideas that are reportedly required to produce change and improvement in schools, teaching and learning. Networks are intended to provide opportunities for teachers to generate, share and learn new ideas. Networked learning can be said to take place when individuals come together in groups from different environments to engage in purposeful and sustained developmental activity. The notion of network stresses the idea of community as the common element and principle of connection between institutions, organisations, agencies and people in which people and institutions are explicitly associated with each other and work together in the pursuit of a commonality of interests and goals

In 2002 NCSL's Networked Learning Communities (NLC) programme was launched which involved over 130 school-to-school networks drawn from over 1,500 primary and secondary schools. The School of Education University of Nottingham was commissioned to contribute to understanding of the impact of the NLC programme through quantitative analyses that complemented the main evaluation of the programme. These analyses were used to create statistical profiles of individual networks using DfES national assessment and examination data on key performance indicators related to pupil attainment and progress at different Key Stages. These analyses were conducted for individual schools and clusters of schools forming networks. They were used to investigate the characteristics of pupil intakes (particularly level of social disadvantage) and evidence of improvement in educational standards from 2003 to 2005 (see Mujtaba & Sammons, 2003, 2004 and 2005). Data from 109 networks were analysed as these constituted the funded networks. Each NLC comprises a group or cluster of schools

[3] The full report is available from Professor Pan Sammons
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working collaboratively in partnership with local authorities, higher education institutions and the wider community to improve opportunities and raise standards for their pupils.

This paper presents the results of a quantitative survey of staff from a random sample of 50 per cent of schools involved in the funded NLC programme for which statistical profile data was analysed. The survey was conducted in autumn 2005 to explore the views and experiences of those involved in NLC. Five questionnaires were sent to each school with a request that those most involved in NLC activity complete these. The response rate achieved for the staff survey was 38 percent (1263 were returned out of a total of 3330 that were sent out), this represented one or more return from 55 per cent of schools sampled (365 schools responded out of 658 included in the survey).

The survey instrument developed by the main evaluators (Aporia 2005) was informed by a literature review and was intended to measure a number of underlying constructs deemed to be important to successful network development. The results revealed variation in respondents' views of the extent of their colleagues' involvement in different aspects of NLC activity. and perceptions of its impact on different areas of school activity and pupil outcomes.

Respondents generally had fairly positive perceptions of different aspects of NLC activity and its impact. Those involved in formal leadership roles (head teachers and their deputies) tended to have the most favourable views of the importance of network engagement and its impact in relation to school improvement.

The survey provided information about who from the school community had been involved in network activities and perceptions of the extent of professional learning opportunities.

Areas covered include:

- Purpose and focus
- Relationships
- Collaboration
- Enquiry
- Formal Leadership
- Informal Leadership

The survey explored these aspects in relation to perception of impact and engagement at the school level and in relation to the network. It also investigated the extent to which respondents perceived that their school was attached to their network, and opinions about changes in thinking, practice, and influence of network learning.

Principal components analysis was used to investigate the underlying structure of survey responses. This indicated that a number of underlying factors are important in accounting for the variation in responses and that these relate quite closely to the theoretical constructs identified in the literature. The most important factor in relation to schools was identified as 'Changes in thinking & practice', followed by 'Leadership' 'Support& collaboration', 'Enquiry', 'Informal leadership', 'Purpose & focus', 'Professional development' and 'Teamwork'.

The results indicated that perceptions of the extent of 'Changes in thinking & practice' were most closely correlated with views on the extent of overall improvement in practice that had taken place in the respondent's school over the last four years.

Significant differences were found between respondents when results were compared at the school level. There was evidence that in some schools views of engagement and impact were more positive than in others. In addition, substantial variation between individual networks were identified when results were aggregated to reflect the network groupings of schools.

Key Findings

A high level of *engagement by colleagues in network activity* was reported by the majority of respondents (over 60% reported that 75% or more of staff were involved) although levels of engagement by colleagues were reported to be low by a quarter of those surveyed.

Teachers and head teachers were the *groups most likely to be involved* in network activity, around a third reported the involvement of support staff and a similar proportion governors. Only a fifth reported parental involvement.

Most respondents had fairly positive views of all aspects of engagement covered by the survey, the main differences were found to involve degree of emphasis to statements in terms of strongly agree, agree or slightly agree rather than disagree. The responses were compared using the type of job as the unit of comparison. Generally school staff in more managerial positions (head school staff and deputy heads) were more likely to report favourable responses to school and network focus questions. Some of these differences were statistically significant.

The extent of *professional collaboration amo*ngst staff was generally favourably rated, most particularly in relation to regular discussion of professional issues, seeking professional advice/support and working together to develop schemes of work/lesson plans. Aspects related to deeper collaboration, such as observing each other teaching, being receptive to feedback from colleagues and discussing less successful lessons were reported less positively.

Generally responses about the *school purpose and focus* being clear were positive with the exception of the item indicating the school focus was displayed in the school.

The promotion of professional learning through *enquiry* is a key aim of network learning activity. Responses to items concerned with this construct were more varied than other sections of the survey. The item receiving the most agreement was that colleagues in their school engage in systematic analysis of data, learn from successful initiatives and regularly discuss past events to determine how they work.

A sizeable proportion of respondents to the survey were heads or deputies (43%). Generally views about *formal leadership* in the schools were favourably rated especially about leaders taking responsibility for the improvement process and monitor progress in our school. There was less agreement that leaders help staff keep their focus when other initiatives are being encouraged/mandated.

The items related to *informal leadership* in schools suggested most perceived that colleagues played an important part and this suggests that leadership was widely shared or distributed in most schools. There was less agreement about the extent to which staff had professional learning opportunities about leadership however.

In relation to *network related school activities* a minority of respondents felt they did not have sufficient knowledge to respond. In general responses, unsurprisingly perhaps, indicated less agreement with items about the strength of network relationships and extent of collaboration and enquiry than was evident in responses about their own school.

In terms of *informal leadership in the network* the highest levels of agreement concerned perceptions of their colleagues' involvement in coordinating network projects, establishing network action plans and evaluating network progress.

Formal leadership in networks was perceived to relate to the coordination of professional activities in the network , provide time for involvement in network activities and take the opinions of colleagues into consideration.

Under *network attachment*, just over half the respondents thought their school was very active in their network, while a third thought involvement had influenced their purpose and focus a great deal. Proportionately fewer thought there had been a great deal of influence on collaboration, relationships or enquiry.

Changes in thinking were investigated in detail in the survey. Around 30 to 50 percent of respondents thought a majority of staff (and a minority or almost all) had changed their thinking or expanded their knowledge in most areas. The item with the most positive rating was expanded what they know about teaching and learning.

Changes in practice in assessment, teaching and the curriculum were more likely to be reported as affecting the majority of colleagues by just over half those surveyed. Changes in relationships with pupils and with families were less likely to be perceived to have affected most colleagues.

In relation to other initiatives *the importance of network learning to improving school practice* was rated as very important by nearly 31% and somewhat important by over 50%. The most favourably rated items in relation to the *perceived influence of network learning* over the last four years were:

The analysis of the factor scores revealed that they provided robust and reliable measures of different aspects of network learning. The closest associations were between the following factor pairs:

'Network enquiry' and 'Teacher collaboration', Factor 6 and factor 3 (0.77)

'Network enquiry' and 'Sharing good practice', Factor 6 and factor 5 (0.75)

'Sharing good practice' and Teacher collaboration', Factor 5 and factor 3 (0.73)

'Sharing good practice' and 'Network relationships', Factor 5 and factor 4 (0.75

School level and network level analyses clearly indicate that responses for individual schools and networks varied. Therefore *what was seen as important or as a high priority differed by each network or schools*. The impact of network activity was rated more favourably in some schools than in others.

The *extent of variation at the school and network level* indicates that network learning experiences are very variable and have different meanings and importance for different participants. In many schools respondents' views are generally fairly positive, but in a minority of schools the impact of network participation is viewed as less influential. In general impact and engagement in the respondent's own school is rated more favourably in comparison with the same items at network level.

Changes in *pupil attainment levels and in schools' value added performance* were investigated over the three years 2003-2005. This is a relatively short time scale in which to expect changes in teaching and learning to show an impact on such measures but fits with the timescale of the funded NLC initiative. A change in school level attainment scores between 2003 and 2005 was calculated for key indicators of performance at KS 2, 3 and 4. These change scores were correlated with the school level survey factors and scale scores to explore any associations between improvements in attainment or value added measures of progress and perceptions of network learning measured by the survey. Earlier analyses have shown that overall NLC schools had lower levels of attainment in 2003 than schools nationally and that as a group they were more likely to have socially disadvantaged pupils (measured by the % Free school meals indicator), especially at the secondary level. This context should be noted in considering changes in their results.

Significant positive correlations were found for improvements in value added results at Key Stage 2 over the three years and improvements in maths (% pupils gaining level 4) and the school Factor *'Changes in thinking & practice'* (r=0.24). No statistically significant differences were found for change in English or science results.

A number of weak but positive correlations were found between the factor scores and scales related to *Formal leadership, Relationships & collaboration, Network collaboration* and results in 2005 for English, science and maths (all in the range 0.14 to 0.22) indicating that schools with better scores on these areas of network activity tended to have higher levels of pupil attainment in 2005 in terms of the % pupils gaining a level 4+.

At Key Stage 3 there was no evidence of any significant statistical correlations between change indicators (% achieving level 5+ in the core subjects) for attainment or the overall value added results and any of the network factors and scales. When raw attainment patterns were examined there were some weak but statistically significant negative correlations, with various factors related to teacher collaboration network relationships and enquiry.

At Key Stage 4 there was stronger evidence of positive associations. The statistical analyses across all networks (Mujtaba & Sammons, 2006) reported elsewhere had shown that as a whole NLC secondary schools made greater gains at KS4 in attainment and value added over 2003-2005).

There were six factors that had statistically significant relationships with the change scores at KS4 for GCSE (%5A*-C) and value added. The strongest correlations were with the factor related to *Overall network influence* and GCSE change score (r=0.38), followed by the factor *Formal leadership* (r=0.35) and GCSE change score. Other factors showing positive associations were *Informal leadership, Professional learning,* and *Network relationships.*

It is not possible to draw direct causal connections between these associations indicating improved educational standards in terms of attainment and value added measures of progress and the survey results of perceived NLC impact. NLC schools will have been involved in other initiatives and programmes intended to raise standards too

such as EiC, EAZ, leadership development courses for SMT and middle managers, inspection etc. Nonetheless, taken together it is likely that network activity has contributed to better results at Key Stage 2 amongst participation primary schools and at secondary level at GCSE. The weak but positive patterns are consistent at KS2 and 4 and point to greater reported engagement with network activity and improved attainment.

Survey respondents certainly perceived a positive impact, though more so on pupil engagement and motivation than on attainment.

There was also considerable variation, between individual respondents on certain aspects of the survey. When results were aggregated to the school level there was clear evidence that perceptions of engagement and impact varied between participating schools and at the network level. Further study of schools with reported high levels of engagement and perceived impact which were also found to have better results (improvements over 2003-2005) would help to illuminate good practice and could inform the further development of NLC.