

## Evidence Based Inquiry

### In Support of A Knowledge Creating School District

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The knowledge-based economy has greatly increased the need for innovation and pace of educational change. Practices for facilitating knowledge creation and sharing are considered to be the key tenets of educational change. Knowledge will be, and perhaps already is, the most critical resource for social and economic development (Hakkarainen, Palonen, Paavola, & Lehtinen, 2004). A fundamental challenge for education then is to organize work with knowledge in a way that facilitates on-going knowledge building and sharing among members of the community. As Hakkarainen et al. (2004) remind us, members of the community need to develop competencies that allow them to function as “knowledge workers.” Consequently, educational organizations need to be knowledge-creating and sharing organizations that quickly respond to emerging needs. This suggests that individuals and the organizations themselves might need to change their practices. Yet changing practice is not as easy as often portrayed, as it involves individuals reconstructing their mental models and their personal professional knowledge. This reconstruction of professional knowledge requires a broader meaning of knowledge. Knowledge can no longer be defined as something externally created, measurable and factual but expands to include knowledge created by individuals as they seek solutions to new problems. This process is difficult for an individual or a small group but is compounded when it involves a large organization.

In *Working Laterally*, David Hargreaves (2003) describes the demands of knowledge creation in terms of innovation and maintains that young people need to be innovative to succeed in work and life. Education can both model this requirement and support its development. Innovation, for teachers, is about learning to work differently in order to work better. For teachers, most innovation is the creation of new professional knowledge about their work.

In order to facilitate substantial and sustained educational change, educational organizations need to function as knowledge-creation organizations, and, if this is the case, we need to understand the conditions that support the development of and sustain such organizations. Since 2000, we have had the luxury of studying the efforts of a large Canadian school district as sought to facilitate substantial changes to practice in order to improve student learning. Through conducting this program of research, we have identified the conditions that supported this school district in becoming a knowledge-creating organization in order to foster significant changes to educational practice.

### **Background**

In many ways, society is in the midst of a social and economic revolution. Economically, western society has gone beyond the information age to stress the importance of organizations supporting knowledge-creation and management. It is increasingly important that social organizations (such as education or health) create, share and manage knowledge pertinent to their professional practice. As D. Hargreaves (2002) warned schools, failure to take such actions could

result in the organizations being left behind and possibly discarded.

Generally, social organizations are not structured to foster innovative thinking. Mintzberg (1989) argues that most social organizations are bureaucratic structures which are designed to follow established patterns. By their nature, bureaucratic organizations are not intended to foster innovative thinking that could challenge existing tacit knowledge or question the 'black box' that frames their world views. Yet forward-looking thinking is imperative as public organizations are being bombarded with technological and social change designed to address current and future change initiatives. Successful implementation of such changes usually involves changes to professional practices.

Typically, bureaucratic organizations support status quo practices through a mechanistic world view of change (Hoban, 2002). This belief system places great value on rationality and logic as it is believed, "that reality could be observed, explained and predicted" (Hoban, 2002, p. 8). As reality is viewed as predictable, knowledge is regarded as certain and permanent. Change to practice is portrayed as a mechanical process with new information being presented to participants who accept this information and then change their professional practice. Educational change, according to Hoban (2002, pg. 13), is portrayed as a simplistic process: "innovation arrival → teacher use → teacher change". In education, the long history of unsustainable innovation suggests that this model has failed to facilitate significant changes to practice (Elmore, 1996).

A world view based on complexity theory has recently begun to dominate conceptual thinking (Fullan, 2005; Hoban, 2002). Proponents of this perspective argue that because reality is unpredictable and ever-changing, knowledge must continue to evolve. Further, they perceive that knowledge by its very nature is socially constructed and open to continual investigation and reinterpretation. Because knowledge is dynamic and emergent, individuals can only "guess" or "approximate" reality (Marion, 1999). Hannay & Mahony (2005) suggest that in such a scenario: "knowledge ceases to be a commodity that can be placed on a library shelf and becomes socially constructed by participants". Changes to practice are perceived as complex given the need to reconstruct individual and collective professional mental models related to professional practice (Hannay, Wideman, & Seller, 2007).

Incorporating complexity theory requires different organizational structures. Innovative or adhocracy, and J-form (Japanese) organizational structures, two of the forms outlined by Mintzberg (1989), could facilitate knowledge-creation. Lam (2000) suggests such structures could provide opportunities to raise individual tacit knowledge to collective explicit knowledge. Any discussion about the nature of these various organizational structures are far beyond the scope of this paper but it is sufficient to quote Lam (1997, p. 977), that the structure can define "how knowledge and skills are distributed and used".

All of this suggests that social organizations need to be reshaped to support knowledge creation in an environment that recognizes deep changes to practice are complex and inherently messy. But it also suggests that the nature of the organizational structure needs to be changed. In a professional bureaucratic organization (Mintzberg, 1977), entry into the organisation is determined by formal education and training (Lam, 2000), and the accrued 'knowledge of rationality' (Nonaka, 1994) dominates both the preparation and experience of teachers and school administrators. As Lam (2000, p. 494) argues, "professional experts have a tendency to interpret specific situations in terms of general concepts and place new problems in old

categories”. This means that the traditional tacit knowledge might remain unquestioned which is typical in an educational organization. However, a knowledge-creating organization requires a questioning of tacit knowledge in order to create collective explicit knowledge. Lam (2000) argues that innovative organisations raise individual tacit knowledge to collective explicit knowledge through such alternative organisational models as operating adhocracy and the J-form. Hannay (2003) suggested that “these organizations focus respectively on embodied and embedded knowledge, both of which are more likely to foster innovation through creating a dialectical relationship between tacit and explicit knowledge”.

Since 2000, we have conducted a longitudinal study of the efforts of one large Canadian school district as it reshaped its’ organizational practices to support knowledge creation. Our longitudinal data suggests that this school district is becoming a knowledge-creating organization. First, the data indicate that individuals in the system are questioning their practice and through that process, are examining their tacit knowledge and assumptions. Additionally, the studied school district is promoting collective and embedded opportunities for the creation and sharing of new explicit knowledge. Thus, as required in a knowledge-creating organization, the school district is facilitating the creation of contextual innovative knowledge as individuals share their solutions (or tacit knowledge) to authentic problems (e.g., Lam, 2000; Nonaka & Takeuchi, 1995; Von Krogh, Ichijo & Nonaka, 2000).

Second, the school district is requiring individual and organizational components to take action to improve student learning (their organizational purpose). The data also indicates the school district also expected that participants continually reflect on whether that action was achieving the stated goal of improved student learning. Such connections to actions are essential in a knowledge creating organization. As Nonaka and Takeuchi (1995, p. 10) explain, “the most powerful learning comes from direct experience” and Von Krogh, Ichijo and Nonaka (2000, p. 27) maintain that knowledge is “ultimately tied to action” when focussed on solving an authentic ‘problem of practice’ (Hoban, 2002). Further, data must be collected (Earl & Katz, 2006) and analysed on that action as this process can spawn a reflective spiral (Earl & Lee, 1998; Supovitz & Klein, 2003) – especially if the data challenges tacit knowledge. The most recent data collected suggest that this action/data spiral is emerging as a practice in the district and in schools.

Third, a knowledge-creation organization must facilitate knowledge sharing and the organizational codification of the contextual knowledge. While the studied school district has embedded opportunities for knowledge sharing into the organization, the codification of created knowledge is not yet institutionalized. When this occurs, the studied school district will go from becoming to being a knowledge-creating organization.

Recently we have conducted a retrospective data analysis in order to identify the conditions and processes that aided this school district to demonstrate many of the attributes of a knowledge creating organization in a relatively short period of time.

## Methods

This paper reports data from several studies undertaken since 2000. These are individually funded studies but all examined the process through which a large social organization could facilitate knowledge-creation and system change. Table 1 summarizes the various studies:

**Table 1: Summary of Programme of Research**

Assigned Name of Study	Year(s)	Source of Funding	Research Reports	Coding
Study 1:	2000-01	Thames Valley District School Board	Attainment of the Vision, Focus Group Report  Attainment of the Vision, Individual Interview Report	Three Focus Groups: (FG) year (00) and role teachers (T); administrators (A) and system personnel (S)  01 (Year data collected) alphabet (school) number (individual)
Study 2:	2001-02	Province of Ontario	Aligning School District Actions to Promote School Improvement and Accountability	S(district)Int or FG (data collection) 02(year) letter(school) P or T (role) number for teacher
Study 3	2002-05	Federal Government of Canada (Social Science and Humanities Research Council)	The Role of the School District in School Improvement  Year 1 Year 2 Year 3  Leaders Leading and Learning	S(district)Int(data collection)03 to 05(year)letter(school)P or T(role)number for teacher  S(district)02(year)S (superintendent) number (individual)
Study 4	2006-09	Federal Government of Canada (Social Science and Humanities Research Council)	Beyond tinkering: The school district's role in large-scale reconstruction of professional practice	In Progress

## **Sample**

We studied a large school district with an area that spans 200 km across the district and covers over 7,000 square kilometres. The school district has a student population of almost 80,000 in 154 elementary and 30 secondary schools. This longitudinal study began when the Ontario government forced four smaller school districts to amalgamate thus creating a new and large social organization. Given we could not collect qualitative data from all individuals in all parts of the school district, our sample included different roles from all areas of this large school district. The sample varied with the data that we sought. In all studies, we wanted to learn from school-level participants as to their understanding of the actions and impact of the school district in facilitating school improvement and knowledge-creation. Therefore, in all studies, we conducted individual interviews in usually about 12 schools per year. For this sample, typically, we asked senior administrators to recommend schools that they felt were representative of the areas of the school district. In each case, we interviewed the principal plus 2 teachers who were actively involved in school improvement efforts.

Less frequently we collected data from others in the organization. In those instances, we sought to understand the perspectives of senior administrators, central office staff, and/or nonteaching staff at the central office or school level. In these situations, our sample was based on roles and geographic areas within the newly created school district.

## **Data Collection**

The means of collecting data were similar in all studies. As previously noted, individual interviews were conducted with principals and two teachers in a given school. In Study 1, we also interviewed the school union steward but found their answers were so similar to the teachers interviewed that we did not repeat this data collection source. In several studies, we also conducted focus groups of individuals in similar roles such as principals, non-teaching support positions, central office teaching support staff (i.e. consultant). When we initiated the first study, we never intended that we were beginning a longitudinal study that would last almost a decade. Yet from the beginning of this programme of research, our initial coding of the all data sources indicated data collection technique, roles and location. This coding is included in Table 1 but it also made a retrospective analysis possible.

## **Data Analysis**

The data set from each study was analysed at the time of the study and a detailed research report was prepared and shared with the school district. Through analysing those data sets, the central theme gradually emerged of how a social organization could facilitate knowledge creation in order to improve student learning. In particular, the research reports from 2002 and 2004 shaped future research efforts as we began to question how individuals change their practice (instructional and administrative) and this lead us to consider the process of reconstructing professional knowledge in order to promote systemic change. Neither the researchers nor the school district began with that premise.

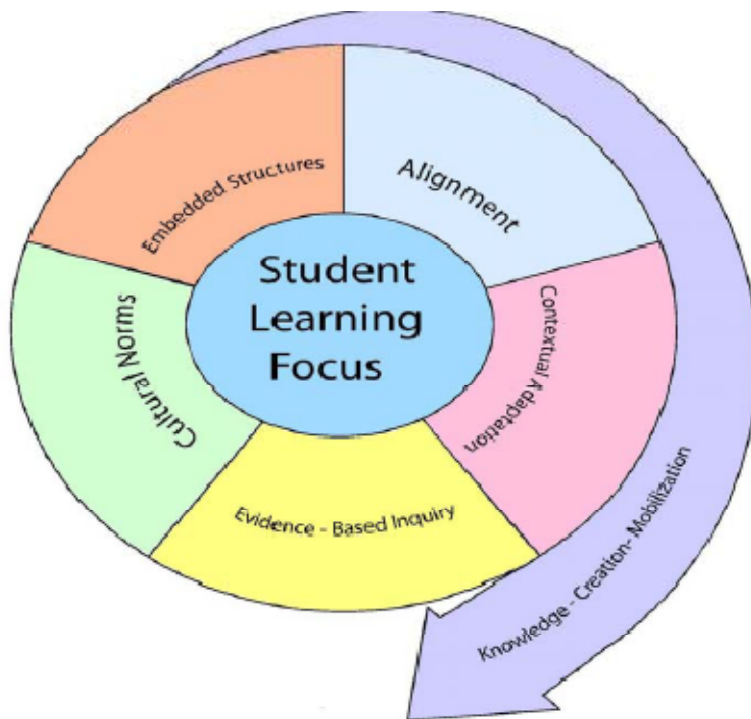
Recently, we conducted a retrospective data analysis. To accomplish this, we analysed all research reports from the earlier studies included in Table 1. In particular, we wanted to examine the longitudinal experiences and actions of this public organization as it dealt with externally created and mandated reforms. In creating and enacting processes to address these reforms, the

organization took actions that gradually allowed it to move towards being a knowledge-creating organization in order to promote systemic change. Through this retrospective analysis we identified the conditions and processes supportive of a knowledge-creating organization and changes to professional practices. The retrospective data analysis process resulted in data displays for each condition and processes. These dated displays allowed us to map the development and impact of each component. Key is the interaction between each component. Individual components do not stand alone but are interconnected with each other to create an environment supportive of knowledge-creation.

## Conceptual Framework

Since the beginning of this programme of research in 2000, we have been organising and reorganising our thinking to create advanced organizers that have provided the framework for each report. Always, the figures have been based on empirical evidence rather than a conceptual model. The data-derived figures allow the reader to connect the parts with the whole and visually capture the complexity of the changes involved. Figure 1 continues this tradition but with a significant difference. The retrospective analysis involves examining all research reports prepared in this longitudinal study. Figure 1 reflects the conditions and processes supportive of a knowledge-creating organization as identified through the retrospective data analysis. These conditions and processes include creating a common focus, embedded structures, alignment, contextual adaptation, evidence-based inquiry and cultural norms.

Figure 1: Interactive conditions supportive of a knowledge-creating organization



Most of the sections in Figure 1 required deep changes to practice. Yet, in education, we have generally been unsuccessful in maintaining such changes and unsurprisingly the history of educational change is full of failed innovations. There is a simple, yet highly complex, explanation: change involves individual learning and yet external organizations typically orchestrate the change process. As Fullan reminded educators in 1982, individuals, not school buildings, change. This means individuals must do things differently if the innovation is to be implemented and institutionalized. As Hawley & Valli (1999, p. 128) bluntly state “the improvement of schools requires the improvement of teaching” or as Elmore and Burney argue “it is about instruction . . . and only about instruction” (1999, p. 9). Such changes can require that individuals learn new concepts or skills thus creating new personal professional knowledge and adapting their personal mental models (Duffy, 2003). However, complex educational change is rarely sustained (Elmore, 1996a; Fullan, 2004; Jackson & Horne, 2004) partly due the lack of attention to the modification of individuals’ personal mental models.

Without individuals reconstructing their mental models, external reforms will remain superficially implemented. This means that individuals will need to learn new practices which most likely will require a rethinking of past practice. While professional learning means learning something new, some authors (e.g., Darling-Hammond & McLaughlin, 1995; Duffy, 2003; Sykes, 1999) suggest it might also mean *unlearning* past practices. While the literature typically refers to this as unlearning, perhaps it is better described as a *reconstruction* of knowledge which is learning, not unlearning. *Reconstruction of professional knowledge* is a complex and problematic process pivotal to successful implementation of educational change. Indeed, reconstructing professional knowledge is more difficult than constructing professional knowledge (Hannay, Wideman, & Seller, 2007).

As neither educators nor schools exist in isolation, the school district role in facilitating systemic change is paramount. School districts, as a social organization, must support the process of personal knowledge creation in order to facilitate and to sustain educational change. This requires alternative approaches to change such as knowledge creation and management. Figure 1 provides a conceptual overview of the processes and conditions through which one social organization (a school district) was able to support individuals changing their practice in ways that supported organizational change. In a series of articles, we examine these processes in greater depth. Figure 1 is complex because it represents a complex process supportive of one large social organization as it moved towards being a knowledge-creating organization. The difficulty in enacting this process is that all conditions listed in Figure 1 are inter-connected, develop at different times in the process, and all conditions must be attended to concurrently. This complexity is why large-scale change to social organizations is so difficult to achieve and to sustain.

Obviously, the results from this work are well beyond the scope of one paper and the discussion in this paper is limited to one condition (evidence-based inquiry). In this section, we provide overview of the conditions and processes that facilitated this school district to move towards being a knowledge-creating organization and the next section addresses the findings related to how a school district is coming to engage in evidence-based inquiry to support their educational change initiatives and how this supported knowledge-creation.

## Findings

### Creating a Common Focus

We begin at the centre of Figure 1 which is the Student Learning Focus. While it might seem sensible that student learning should be the centre of actions in an educational organization, this was not always the case. When we first collected data in 2000, it was obvious that individual participants were concerned with and taking actions focussed on student well-being. However it was equally obvious that the school district, typical of a bureaucratic structure, had compartmentalized actions into specific departments of the organization. Each senior administrator took action to support students but often these actions were unconnected to actions taken by different departments led by other senior administrators. Early data indicated that this compartmentalization had resulted in a “silozation” of the system. However, the 2001 data suggest that school administrators perceived a need to connect the various initiatives at the school level. An early response of the system was to create a common Vision of a Caring Learning Community across the school district. The data suggested that while the Vision was relatively successful in creating a common perspective, it failed to engage most teachers and principals interviewed because it was considered too esoteric and disconnected from classroom practice.

By 2003, senior administrators replaced the Vision with a more complex representation that had Improved Student Learning as the centre of the school district graphic. Being a Caring, Learning Community remained in the new representation but was visualized as supporting the system focus of improving student learning. This more complex image of the district vision was critical in creating a supportive environment for knowledge-creating organization. First, it made the core purpose of the organization the centre of the actions of the organization. The slogan became ‘make the main thing the main thing’. This slogan appealed to educational practitioners as it recognized their ‘ethos of practicality’ which was improved student learning (Doyle & Ponder, 1977). Second, while the organization created a central focus on student learning, the data suggest that the system also recognized that the focus had to reflect different contexts within the organization. This realized that sub-sections of the organizations, such as schools, each had different organizational realities that need to be recognized. Third, increasingly since 2003, the focus became the lynch-pin that shaped the actions taken in all of the surrounding conditions depicted in Figure 1. The focus on improved student learning became totally inter-connected with the all other conditions and actions taken by the organization.

This knowledge-creating organization created a strong, common and sustained focus built upon the core purpose of the organization. The purpose of educational organizations is student learning. This purpose was not just be a pretty slogan on the wall but became the mantra that guided all actions of the organization. As well, the focus was used to decide what actions were key and which actions were extraneous to the goals of the organization. At the same time, the focus was not written in stone but evolved in a reasoned manner to reflect emerging circumstances.

### The Conditions/Processes to Support Knowledge Creation

The conditions in the outer ring of Figure 1 did not occur in a sequential manner and the order of their development would vary by context. The retrospective data analysis indicates that these

conditions evolved at different paces and at different points of the process. The analysis also suggests that it was the interaction and interconnection between the conditions that supported an environment facilitative of knowledge-creation. But the connection with the centre, or the focus, was constant and critical. With those caveats, we first examine the embedded structures condition.

### **Embedded structures**

Initially, senior administrators and their departments operated as silos. Each silo had different demands for schools and the school administrators sought to connect the various initiatives. By 2002, senior administrators sought alignment across all departments in the organization. They began to use traditional structures and procedures to support the application of the system focus – the Vision and then on the focus of improved student learning. For instance, senior administrators adapted the regular school administrators meetings to incorporate professional development for school administrators related to implementing the system focus (centre of Figure 1). Following the lead of the senior administrators, school administrators also adapted school level structures and procedures to incorporate professional development activities for teachers related to improving school learning (centre of Figure 1). Similar adaptations occurred throughout the organization. Thus existing organizational structures were used to support the system foci on improving practice in order to improve student learning (depicted at the centre of Figure 1). Embedding system change into the fabric of the organization meant that time was used differently. The collaborative efforts to improve organizational practice happened at the normally occurring meetings (i.e., school administrators meetings) and through typical school district and school procedures. This gradually facilitated a reconstruction of practice to support system change. Such changes resulted from deliberate actions taken by the senior administrators of the school district, and these actions were adapted by school administrators for use at the school level.

The knowledge-creating process was advanced when social organizations embed changes to practice into their existing structures. First, using the existing structures to support the organizations focus or purpose re-enforces the seriousness of the intentions. Second, embedding this process into regular activities uses time differently and therefore decreases the ‘extra’ time necessary to address the change initiative. Third, and perhaps the most important for the knowledge-creation process, embedding dialogue about the change initiative into normal organizational structures reflects the ‘ethics of practicality’ (Doyle & Ponder, 1977) or the moral imperative of the organization (Fullan, 2003). Educational practitioners entered their profession because they wanted to help children learn. By embedding changes based on the purpose of the organization into the fabric of the organization, professional dialogue connects to the focus of the organization (centre of Figure 1). Questioning mental models related to past knowledge and creating new knowledge on the focus embeds the process into the organization.

### **Alignment**

The retrospective data analysis documents that the school district became increasingly aligned. By 2002, deliberate school district actions were leading to a strong sense of connectedness (Hannay, Telford, Bray & Bronson, 2002). By 2005, there was even stronger evidence that the school district had aligned parts of the organization into a cohesive whole. This was far different than independent ‘silos of interest’ that were apparent in the first few years of this longitudinal

research programme. By 2005, district, school and individual educator goals were aligned with the system focus on improved student learning (centre of Figure 1). Other school district procedures were also aligned with the system focus, for example: the nature of the professional development activities, allocation of personal and material resources, and/or hiring policies. System actions were determined on whether the action advanced the focus of improved student learning. If the action failed to connect to the focus (centre of Figure 1) then resources were not allocated to that action. This had created the coherency so critical for organizational change. As Fullan (2000, p. 21) suggests, “coherence- making involves aligning individual professional development, learning communities and program goals and activities” or what Louis, Toole, and Hargreaves (1999, p. 257) call “solution-interconnectedness.” Alignment of different organizational components focussed on the centre organizational purpose builds inter-connectedness that is the cornerstone of understanding the process of complex change. This is even more important for a knowledge-creating organization. When the goals of disparate parts of an organization are the same or similar, then the usefulness of knowledge sharing becomes more apparent. If an individual can learn from the experiences of others in the organization, then the process is highly useful. Knowledge can be transferred within the organization. If this knowledge creation and sharing happens through the professional dialogue deliberately occurring in the embedded structures then the knowledge-creation and sharing processes can be incorporated into the fabric of the organization.

### **Cultural norms**

Since we began this programme of research, we have sought to understand the cultural attributes of the studied school district. Culture is a nebulous component that impacts on virtually every part of an organization. Yet culture is not an artefact that can be labelled or placed in a museum cabinet. Culture is a living entity that slowly adapts or evolves. In its simplest terms, culture represents ‘how we do things around here’ (Deal & Kennedy, 1982) that shapes the actions of participants. The cultures of social organizations are formed through past and present experiences and participants. Too often the cultures of social organizations are influenced by unquestioned past practices in such organizations. Not surprisingly, Fullan (1999) argues that reculturing might be the most influential factor in any change effort because deep change requires that participants reconstruct how things are done and defined. Such cultural attributes characteristics or evolve rather than change overnight.

The retrospective data analysis documents that gradually the cultural attributes became cultural norms in the studied school district. This is a powerful statement to make. Norms reflect the patterns or practices that are considered as typical behaviour or perspective. Our longitudinal data analysis documents that the cultural norms of the school district have been modified and adapted to support the system focus (centre of Figure 1). Ideas have evolved and become richer and deeper, as the system built on and incorporated various cultural attributes. In 2001, 2002 and 2003, participants reported the existence of teamwork, dialogue, continuous professional learning; in 2004 they included professional dialogue and collaboration; in 2005, they added deprivatization of teaching practices, reflective dialogue; in 2006, they included risk-taking; and in 2007, they voiced their concern with sustainability. This cultural evolution has facilitated reculturing. The cultural norms that emerged supported a safe environment through which individuals could question and challenge their past professional mental models in order to change their practice.

Such a supportive culture is necessary for individuals in a social organization to question and construct alternative individual and collective mental models within a knowledge-creating environment. If individuals are to become involved in such questioning, they require a culture that allows them to share what worked and did not work in their practice. They need to be able to conceptualize and enact alternatives and then collect data (Evidence-based Inquiry in Figure 1) on whether those alternatives work or do not work. Organizational participants need the opportunity (embedded structures in Figure 1) to safely engage in professional dialogue and reflective practice (Barth, 2002; Duffy, 2003) in ways that encouraged them to reconstruct their mental models. And if the social organization is to improve, they need to share their revised models in ways that adapts the norms of that organization. In other words, knowledge-creation is advanced if there is a continual interchange between tacit and explicit knowledge (Nonaka & Takeuchi, 1995) in a supportive culture. Through such a process, individuals can reconstruct their professional mental models related to their practice and to their conceptions of their organization.

### **Contextual adaptation**

The importance of contextual adaptation was noted early in this longitudinal study, in the 2001 report. That data suggested that the Visioning process only began to be truly effective when the ‘cookie-cutter’ approach was abandoned and schools were encouraged to adapt the Vision to meet their school needs. Individuals accepted the expectations based on the school district reform agenda, but they reported the necessity for flexibility and a recognition that the context of schools differed from each other. Participants wanted to work on an authentic problem that was useful in their work context and they also wanted these problems connected with the system focus on improving student learning. Practitioners will label something practical or authentic if it represents real issues and real needs connected to taking actions in real contexts. Putnam & Borko (2002, p. 12) maintain that this sense of an authentic problem is critical for adults to engage in constructing professional knowledge. They suggest: A focus on the situated nature of cognition suggests the importance of *authentic activities* in the classroom (italics in original. . . . (for teachers) we consider the kinds of thinking and problem-solving skills fostered by an activity to be the key criterion for authenticity (italics added). Real school-based problems require active solutions not passive introspection. Action needs to be based on conscious and reflective decisions derived from experiential learning. Certainly, a component of the ‘ethics of practicality’ (Doyle & Ponder, 1977) is the need for practitioner to take action within their work context. The longitudinal data analysis suggests that early in the process the school district (as a social organization) recognized that individual school contexts required different actions. Such recognition was critical in fostering organisational change

Contextual adaptation enables knowledge-creation because it grounds the knowledge being created in real and authentic contexts. When these contexts are connected to the primary purpose of the organization, it taps into the moral imperatives of why individuals initially selected the profession. Additionally, when professional dialogue related to contextually different authentic problems are embedded into normally occurring organizational activities, it creates a means of sharing the new knowledge. Even more powerful knowledge-creation happens when different contexts begin operating through evidence-based inquiry.

## **Evidence-based inquiry**

The rest of this paper focuses on evidence-based inquiry as a process for creating and sharing knowledge in the district. In short, we found that there has been a progressive increase in attention to evidence and participation in an inquiry process to reflect on and use the evidence to change practice. Since the initiation of this longitudinal study, participants have talked about the importance of data. Yet the meaning attached to data has changed rather dramatically. Initially, data were considered to be the results of mandated provincial tests and the major goal of the senior administrators was to increase student achievement scores. Generally, most teachers and some school administrators perceived this process as punitive. Half way through the retrospective data analysis, there was growing evidence to suggest that teachers and school administrators were considering data from externally controlled events (i.e., Directed Reading or provincial test results) to be indicators of improved student learning. It was only in the last data collection in 2007 that there was evidence participants were entering into a data-spiral in which data were being collected on professional actions and that evidence was being used to reshape professional actions. This is the process that we are investigating, in some detail, in this chapter.

## **Evidence – Based Inquiry**

In this paper, we look specifically at the evolution of the use of evidence-based inquiry as a process for knowledge creation and changes in mental models that could influence practice to achieve the vision of enhanced student learning. As Senge (1990) said, a learning organization is one that is “continually expanding its capacity to create its future”. This is not a linear or mechanistic process, but an iterative process of “thinking in circles” (O’Connor and McDermott, 1997) with a series of decisions, actions and feedback loops guiding the process.

This kind of thinking is dependent on having and using evidence, using the evidence as a foundation for inquiry about current practices and possibilities and then moving to action based on the new knowledge that is generated. The evidence provides a basis to ascertain needs, monitor progress and assess the value of the changes. Collaborative inquiry provides the process for problem framing, evidence-collecting, reflection revised action and reassessment.

One of us has written elsewhere about developing an inquiry habit of mind – a habit of using inquiry and reflection to think about where you are, where you are going, and 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, 2006). Leaders with an “inquiry habit of mind” genuinely want to know, even when the knowing is difficult or contrary to their beliefs. Rigorous data collection and interpretation - not just intuition and past practices - become the foundation for decisions and actions of participants (Chrispeels, Castillo, & Brown, 2000; Hopkins, Ainscow, & West, 1996; Lambert, 1998; Rallis & MacMullen, 2000). This “inquiry habit of mind” allows them to consider a range of evidence and keep searching for increased understanding and clarity by engaging in a spiral of systematic analysis of the situation, professional reflection, action and reanalysis. This inquiry cycle of wanting to know, appealing to evidence and making changes to practice that will actually influence student learning is more than periodic consideration of external data. It is fundamentally a process of knowledge creation in which individuals collect data on actions and engage in a process that questions past assumptions, past tacit knowledge, and past mental models. They consider the evidence and use it to share, question and possibly adapt their respective tacit knowledge, in order to create new collective explicit knowledge.

Intuition and gut feeling – the foundation of tacit knowledge – become hypotheses to be confirmed or challenged in relation to the available evidence. Addressing those assumptions, past tacit knowledge, and reconstructing the mental models through data can result in knowledge-creation and construction of meaning.

Collaborative inquiry merges deep collaboration with consideration of evidence and reflection as in an iterative process of “joint work” (Little, 1990; Smylie, Bay, & Tozer, 1999) to search for and consider 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, to pose more questions and to embark on a course of action to address authentic problems (Katz, Earl & Ben Jaafar, in press).

Learning organizations operate in cultures of collaborative inquiry (Fullan, 1993; Hannay & Ross, 1997, 1999; Hargreaves, 1994; Harris & Hopkins, 2000, operating from data to address “real problems and real solutions” (Garmston & Wellman, 1997, p. 112). Evidence-based collaborative inquiry can occur systemically to address system issues and inform policy and it can be used locally to investigate issues of practice. 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.

Timperley et al., 2008, in a Best Evidence Synthesis of professional learning for teachers that influences student outcomes, described an inquiry cycle that begins with a consideration of student learning needs, moves to an explicit articulation of the relationship between teacher practice and student learning in relation to the student learning requirements, and charts a course for professional learning that will deepen professional knowledge and translate into changed practice. The process is cyclical, but forward-moving, with explicit attention to the new practices and a return to the next consideration of student learning needs. Inquiry and professional learning are inseparable in this model; they merge in a forward-moving, *progressive* way.

In systems and in schools collaborative inquiry creates the conditions where individuals and groups can rethink their beliefs, generate new knowledge, and change mental models. As a result, they are willing to actually move to action and change their practices. In our retrospective analysis, we looked particularly for examples of evidence-informed inquiry in the district and in the schools. This included examples of inquiry-mindedness, using data and/or inquiry to pose questions and engage in reflection, or shifting mental models. We have presented the data in an evolutionary time line beginning in 2000.

### **Year 1 (2000) – Data, What Data?**

In 2000, the first years of our research in this school district, there was very little attention to data either at the district office or in the schools and no indication that leaders in the district or teachers in the schools were engaged in systematic inquiry that could create the conditions for them to reflect on their practices and challenge their mental models. The Ministry of Education had recently implemented a large scale assessment system across the province; so it was no surprise that the interviewees mainly perceived data as large-scale assessment that was externally conducted and controlled and that had the potential to get in the way of their work.

Because in education there's this huge push to measure, from the Ministry and the various school cultures and now in our schools, with respect to learning. So that's a lot harder to do on the caring, half of the vision caring learning for communities and schools. It's so nice to have that kind of a human emphasis that can be, maybe, measured in other ways but not just a merely digitally. [FG00A]

No one mentioned that evidence could be valuable to them in understanding their own circumstances or taking action.

## **Year 2 (2001) – Because We Have To**

In 2001 there was some indication that there was more interest in data but, when it was mentioned, the concept of data remained large scale and not necessarily connected to action.

We've had surveys and EQAO [large scale assessment] results. When we get the results we'll sit down and we'll look at it all. Then we'll evaluate where we are, do a needs assessment again in June. [01J3]

Things have to be measurable these days so you have to have some kind of a measurable. So we took last year's Term 3 report cards and our principal did a statistical [analysis], everyone had to submit on a grid, how many level 1s, level 2s, level 3s in our core subject areas and focusing mainly on the writing and we were interested in the reading too. That was going to be our pre-test scores and then at the end of this year the same thing will be done for post-test scores. [01E5]

In this year, several interviewees mentioned an increase in reflection or reflective practice, although it was connected to the Vision, not to inquiry or evidence.

I'm hearing from people that it [the Vision] made them reflect on their own practices in life, and certainly their practices at school. Not so much their methodology and their teaching, but just themselves as people and how they act. [01B3]

Prior to the Vision, we never had reflection time. It was more like you were just defensive and ready to bat. The Vision allows you to step backwards, to calm down, while you're reflecting. . . . I truly learned that I don't think they [teachers] feel valued. So that we have to do things to make them feel valued. [01E5]

There was also a glimmer that some schools were becoming involved in a collaborative inquiry process at the school level that had the potential to lead to reflection and action, but these active changes had not yet happened.

I would say that it's largely due to the school growth plan and writing process. We are much more consciously and reflectively looking at how and what we're grading when we're looking at language and how it's used. The use of rubrics, the designing of rubrics, finding ones that work. Finding ones that might be able to work between the grades so that . . . ideally, the kids would start to become familiar with the rubrics that were going to be used to assess them, and they would use to assess each other for peer and self-assessment of writing. [01F1]

### **Year 3 (2002) – Being Accountable and Knowing Where We Are**

In 2002 there was a decided shift in the attention to using data and to engagement in an inquiry process, at least among principals (Hannay, Telford, Bray & Bronson, 2002). Although the focus was still on large scale assessment data, the purpose was not to just collect data for data sake, but as a way of determining actions to further improve student learning and achievement (Hannay, Telford, Bray & Bronson, 2002). Although the focus was shifting, the tone of the discussion continued to be one of accountability and the inquiry process occurred because the district leaders were encouraging it.

Looking at data in a more, and I guess I want to say in a stronger way. Because data has always been there. But we really haven't been encouraged to take a close look at and use it in a positive manner in looking at strengths and weaknesses. So getting the feedback from the data. Expectations have changed and it's accountability. [SInt02CP]

Our SO has taken a great interest and has taken a fairly assertive stand on what the expectations are. We, as a Family of Schools, are expected to show an increase in our EQAO scores. We are expected to review and understand what our report card data means and looking at ways of improving student learning. Actually I'm quite pleased because I've taken a stronger view with that as well over the past couple of years. [SInt02CP]

We have to find some way to collect some data to allow us to feel that we are really doing what we've said we've done. Although I want to do that, my own feeling is that we have to be careful how we do that so that it isn't an intrusive way. People aren't suspect of why we are collecting the data or what it is we are going to do [with it]. [SInt02VP]

There was also some indication that the school district was collecting and using data to inform system actions. A principal explained:

[Superintendent] has asked for our report card marks, which he/she then gave to [school district research office]. That provided feedback to us which I found very useful. He/she kind of got the ball rolling for school-based data so we could look at it ourselves. [SInt02YP]

Participants reported other district level data collection actions in areas that were not related to student achievement directly but could be considered to be mediating factors and contribute to a cycle of inquiry (Hannay, Telford, Bray & Bronson, 2002).

[District personnel names] are collecting data on professional development work that each school is engaged in. [Superintendent] was collecting data on the Attainment of the Vision. So there's lots of data collection. [SInt02FP]

Although there was an increased interest in the use of data at this stage, we did not see any evidence that data were being collected either by the district or the schools to examine and think about their agenda for change or the school improvement processes that were being implemented. Nor was there was any systematic process to engage in a cycle of reflection on practice as a mechanism for adjusting, enhancing or rethinking action. Data were still being perceived as externally controlled and participants reported very few examples of collecting data

on the processes they were employing to improve student learning either within the district or in their schools (Hannay, Telford, Bray & Bronson, 2002).

In a few instances, schools were beginning to engage in collecting and considering data as part of their examination of the state of affairs. One principal provided a detailed example demonstrating how he/she engaged staff members to gather site-specific data and then compare it to externally-collected data. Then the principal explained how the knowledge gained through this comparison was used to take data-based action. The principal explained:

So we had teachers identify what their gut reaction was to the kids' strengths and weaknesses. Then we did the actual numbers [compared to external test results] to see if it truly was what they thought. There were some differences which caught us by surprise. Then we had a session where we looked at where were those weaknesses and what things are causing those weaknesses. [We identified] which ones do we have any control over. Then we did a half-day workshop down at the board office where an [individual] from another school came in talked about how he/she was setting up their programs. So the staff shared their strategies in the weakness areas and strategies [from the other school]. It was a dialogue that went on and they are continuing to dialogue. [SInt02HP]

At this point (2002) in the history of the school district, evidence and inquiry had certainly entered the lexicon of some of the leaders in the district and at the schools, but it was far from common practice in the schools and it was not a routine cycle of inquiry and action.

#### **Year 4(2003) – Might As Well Get Used To It (And It Just Might Help)**

By 2003, the use of external assessment data was more widespread, largely because the provincial government had set targets for improvement in Ontario schools and the provincial assessment office was providing directions to schools about how to use the data for their annual school improvement planning. This direction was reinforced but the school district.

The main way that I've seen educational reform coming down is the EQAO testing, and the way that this testing has forced the Family of Schools and the school board, to look at assessment in a much more professional and objective way. So we have our Family of Schools, and this school in particular, have experimented with improved assessment and tracking of assessment from year to year. Which is something that was not done in the past.[SInt03:TT1]

The 2003 data also contained examples of schools using data (provincial assessments or other locally mandated diagnostic assessments) in planning school-level activity (Hannay, Telford, Mahony, & Bray, 2003).

[Looking] at specifics in the area of EQAO, where are we strong, where are we weak? Specifics on the DRP. How did our kids do? [Then] planning how we're going to address those needs. I give the group a task and tell them, "Okay. I need you to go and discuss this, how you're going to address this." . . . Is what the 1, 2s are doing consistent with the 2, 3 class? [SInt03:SP]

I took the results that we get from the CAT scans for example, and the CATS and tests and the results that we get from the DRA. The DRA has

been invaluable. So that is really helpful, Board driven, Board-driven assessment initiative. Being able to find out what level every one of those primary students is at is marvellous. [SInt03:VP]

Teachers were also beginning to use evidence to think about their classroom practices and they were using additional data, beyond the provincial assessment.

Our last two years we've really been working hard on literacy. We really have been working very, very diligently on improving reading scores. We've been doing DRA, running records. We've been promoting reading at home. We've done as much as we can to let the parents know how they can help the kids at home. That's been our big, big thing, and we saw a lot of improved results last year. Now, we looked at writing this year as well. You don't want to let the reading slide, but we know our writing scores are low. So once again, in those primary meetings, we talk about, "Well, how are we going to nail that down? What are we going to do?" We actually had a meeting with one of the teachers on special assignment and she kind of brought in, "Okay. We have the data from DRA. We have this First Steps document. We have all this data. We have all these resources. How are we going to blend them? How are we going to make it work?" We went, "Oh, this makes a lot of sense." So we have definitely a strategy. [SInt03:LT1]

The district leaders were very much at the heart of this move to evidence-based inquiry and were themselves reflecting on the nature of the data that was being used and what information it was giving them. As one Supervisory Officer stated the system leaders needed to ask (Hannay, Telford, Mahony, & Bray, 2003):

How effective are we [district]? Are these the right indicators? How do we know?" We think these are the right things, and then why isn't the practice changing? Why is change not occurring as we thought it might be? Why is morale still not where we would like to see it? [SInt02:SO5]

Supervisory Officers also reported that teachers were becoming more astute in collecting and analysing student achievement data. They hinted that teacher and principals were more engaged in reflective questioning and reflective practice related to their increased sophistication with data-based decision-making and action (Hannay, Telford, Mahony, & Bray, 2003):

What are they doing differently? They're looking at data. They're not looking at it correctly yet, but they're looking at data. They have a plan. PD has become more important . . . They're using data right now more as an autopsy rather than a CAT scan.[SInt02:SO4]

Last year when I talked to Vision leaders about data collection, they struggled with trying to tell me what data they were collecting. This year they have no problem articulating what the data means to them in their classrooms. [SInt02:SO6]

Perhaps most interesting at this stage was the possibility that data was beginning to create the disturbance that could lead to questioning of personal and school practices (Hannay, Telford, Mahony, & Bray, 2003)

These are the kinds of strategies and questions we need to be having our students look at and understand," rather than saying, "Oh, gosh, we've

got to get our EQAO scores up by priming them for it". I think there's been a shift. There is no longer just, "Oh, it's the EQAO test." But now it's, "How can we better facilitate our children to get them to understand when you say, use the information from the story and your own ideas." Using information means you have to go back and look through and skim. So then we've got skimming and jot notes and all those kinds of things that we maybe didn't look at quite as much before. [Sint03:VT2] (italics added)

According to some Supervisory Officers, teachers were experiencing a conceptual change, from focussing on teaching to focussing on learning. As well, they were beginning to use data differently, with data now being used not only to assess what the student has learned but also to determine the next appropriate action to further that student's learning (Hannay, Telford, Mahony, & Bray, 2003):

They're [teachers] designing their programs more from identifying what the student will need and determining more effective ways of assessing that so they're going to know as the program is implemented. They've changed their practice from starting with focussing more on the students. Focussing on what the student is learning and having really good methods of assessing how that student is going to demonstrate that learning and then matching their teaching strategies and the learning strategies. In many cases their teaching practices are changing. They're definitely doing a much better job of assessing students. [SInt02:SO5]

In 2003, data was becoming more incorporated into regular practice with participants reporting that they were adapting and using externally created data as the impetus for a cycle of inquiry. There was also more engagement in collaborative activity within and across schools, often tied to learning from evidence. Both Superintendents and principals were taking direct actions to facilitate this emerging distributed collaborative responsibility. The principals who were interviewed strongly voiced the need to improve student learning in all schools across TVDSB, not just in their own schools. For instance" (Hannay, Telford, Mahony, & Bray, 2003):

The whole use of data and accountability, being accountable for results, not just at the school level, but at the system level. Now I see schools working together to try and bring everybody's scores up. Sharing strategies and talking about what kind of assessment that will work and principals working at it together. [SInt03:YTP]

At the same time as these glimmers of change towards evidence-based inquiry emerged, some people expressed scepticism about whether the inquiry process was really pushing teachers to engage in the kind of thinking and reflection that will really change their practices.

It's a great paper exercise and there may be no real changes in behaviour. It's superficial. Unless the action plan relates to school improvement plans, is questioning practice, and there are a lot of activities around classroom practice, you're not going to improve student learning and you're not going to change behaviour. [SInt02:SO4]

### **Year 5 (2004) – Learning to Like Data and Inquiry**

By 2004, the provincial assessment was a driving force in the district, with district leaders

expecting these data to be used as an external measure of student knowledge of the curriculum in school improvement planning and school administrators doing the same.

[Senior administrators] want to see better EQAO results”  
[SInt04:DDT1].

A lot of that, I do believe, has come from the provincial testing as much as we don't think it is worthwhile. It has brought out the different questioning levels for teachers. [SInt04:KKT1]

We are really accountable here for this. So in some sense EQAO was a real, as much as we can bemoan the Conservatives, I think it was a real shot in the arm to the education system to wake up. I don't begrudge it and I am glad it happened. [SInt04:JJP]

Along with this formal accountability, there was more evidence that they were also using data to reflect and to reconstruct their knowledge and mental models.

Learning from experience and you do that by being a reflective practitioner. So reflecting. I think reflection can be through that peer interaction. . . . You try something and then you think on how did that go. Something happens and you think, why did that happen or should we be doing something different because this happened. [SInt04:CCP]

Why am I teaching this? What would be the best way to teach this?  
[SInt04:FFT1]

Teachers were talking to one another about school districts initiatives and then were sharing their emerging knowledge with their colleagues through professional dialogue. This process was similar to the tinkering process described by Hargreaves (2002), which encompassed reflective practice. They were taking action, collecting data on that action and then reflecting on the impact of their actions on student learning. Moreover, increasingly they were doing this collectively which was fostering the deprivatization of teaching. (Hannay & Mahony, 2005).

You've realized that you did it this way, it didn't work or you didn't like it or it didn't feel good or you didn't get the expected outcome. So now you are going to play with it. You mould it. It is just like every situation because every year is different. The people are different. The players are different whether it is your students, parents or staff. It is almost like plasticene and you are moulding all the time. For me, the greatest professional learning comes once I reflect. [SInt04:BBP]

At this point (2004) we saw the first examples of school leaders intentionally creating the conditions for the use of data and reflection to expose and potentially shift mental models.

One of the things I did with staff last year to get them really thinking about their teacher practice, was I had them do what I call monthly progress report sheets or reflection sheets. They were to write about something that really worked well in their classroom that month, but it was particular to the school goal. So then they had to think, they had to reflect, about what they were doing, and what would I do differently? I had them do that every month last year. It was tedious, but at the same time it got them to reflect, it got them to know that it's important to reflect on your teacher practice. Now I see them doing that

automatically. I don't have them do it anymore on paper. [SInt03:VP]

### **Year 6 (2005) – Moving Towards Evidence-Based Inquiry For Knowledge-Creation**

In this year of data collection, using data for both accountability and for improvement had become much more pervasive. The district was requiring a school improvement plan and an annual report of actions and outcomes to foster attention to school improvement and to accountability together, with school teams using data to ascertain their progress in relation to goals.

I know that at the end of June each school is expected to send in a report on their school improvement plan and how well they've done. So that's when you get into the more technical things with the data collection and what things worked and what things didn't work, what things you want to do next year. [SInt05:QQP]

Looking at the EQAO testing and the trends that have been happening, we can address concerns that are happening. [whether] we have met with our school goal. [SInt05:NNT2]

That's another piece that the board's now asking for, is accountability. What are you doing? Is it working? How can you show me it's working? And I think that, once again, it comes back to that literacy, that DRA piece, that levelled reading piece that we do, all of these things that we do to say, is it working? Can I be held accountable for actually seeing that the kids learn? Not that I taught it. But whether the kids actually learned it. [SInt05:XXP]

Data were being used to question tacit assumptions as well as provide clarity about directions for improvement and provide evidence of success.

We need to look at student improvement and our failure rates. We started collecting data on that and that's been good for our staff, whether they want it or not. It has been good for them. 'Cause they're really opening their eyes to all sort of possibilities now for school improvement. Whereas before, it was just well the mark is the mark and at the end, so be it. [SInt05:OOT2]

When you put all of the data, compare all of the data together, you really get a clear picture and you see patterns in this school. You see what we're doing well. [Sint05:RRP]

It really makes you feel good when you have that chance to read with the child again, individually, one-on-one in May, and see where they've come from in September. I think they would all say it makes them feel proud. [SInt05:XXT1]

As classroom teachers sometimes you forget where you started. On the graph you can see, wow, they really did jump eight levels this year. [SInt05:PPT2]

The kinds of evidence that people were using was also being extended beyond provincial assessment results to other local assessments and other indicators.

We do a DRA assessment in September and we do another in June. So for those children that we have for the full school year, you see an improvement in their reading skills through the course of the year. [SInt05:PPT1]

It gives us a lot of data, so really we're using the DRA to see what sort of growth we've seen over the year. [SInt05:RRT1]

We use the levelled reading tests. We use levelled math tests. We use our DRA. And we use phonological awareness. We use story retell. So we have all of those pieces. And we can identify where the kids are. We do it in the spring, do it in the fall. And it gives us a real good handle on what they know, what they don't know, and what we're going to do about it. [SInt05:XXP]

So we had tracked every discipline incident electronically and that showed clear patterns. Then what we said was, all right if it's the Grade 6 boys, and it seems to be this kind of behaviour, why do we wait for the behaviour to happen to deal with it? Let's get in there and offer up some teaching and see if we can solve the problem before we ever have the problem. [SInt05:VVP]

Some individuals commented that they wanted a more immediate connection between data and action and that they would like teacher judgment to be valued as well.

Like DRA, when they take it and analyse it, for us to get it back, it's not valuable to us anymore because it's so far after. [SInt05:RRT1]

I really feel that what is missing is the value on the professional judgements of the teacher, especially an experienced teacher. There are times when I feel my professional judgement is very much undervalued. [SInt05:MMT2]

For the most part, the evidence being used was limited to student outcomes, with little attention and some concern about how to measure changes in professional practice.

Our goal this year was to increase the teachers' repertoire of instructional strategies. I think I can subjectively say yeah, I think we have. But can I measure it with data? No, I can't. [SInt05:MMP]

Has there been any real big change? No, I don't think so. Has there been some growth? Yeah, I'm sure there has. But not something that's really measurable. You're not going to get any physical data on that kind of thing, I don't think. [SInt05:MMT1]

Although the process was still not universal or free of problems, it was clear that individuals at the school level were viewing data in broader terms and, more importantly, were employing data to determine actions and that their interest was internal, not directed by external forces.

I know that they are really into collecting data to back up all their findings so they're not just doing it for doing sake. I think that we've really increased our use of existing data and different instruments to kind of measure change. [SInt05:SST2]

Data can help me. I don't have to wait for anybody to ask me to get it. I can collect it myself. I can talk to the other people that I work with about

my data. Then I can go back and do something about what I had discovered. I am the one who is responsible for that job. [Sint05:VVP]

I think through target assessment of data and then target intervention, I think we are seeing those areas improve. We're really identifying those kids who are struggling. Truly looking at data and then trying to come up with interventions that will be successful for them. [SInt05:WWT2]

Although using evidence was increasingly part of the culture of the schools, there was still concern that they were not actually getting to the kinds of changes to practice that would address the needs of individual students.

We collect data here all the time and we're looking at our data all the time. And the only reason to look at the data is to make change in the classroom. And specifically to target the areas that are in need, right? But when it comes to specific data to address change in the programming in the classroom or addressing the needs of the specific child academically, we have more difficulty with that. [SInt05:PPP]

There were very beginning suggestions that evidence and inquiry could be used to assist individuals in identifying their tacit knowledge and practices.

We just talked about different strategies and they said, "Oh, I never thought about that," and "I've been doing this and I shouldn't have been doing that. I didn't realize I wasn't giving them wait time. Like, I was asking them the question and wanted them to answer right away right after somebody else or give them the answer, but they need the wait time." [SInt05:RRP]

### **Year 7 (2006) Evidence-based Collaborative Inquiry**

In the final year of data collection, there was considerable evidence that schools were being more attentive to evidence and that there were pockets of collaborative inquiry. The process on using evidence for inquiry was becoming institutionalized at a district level and individual schools and groups of teachers were more engaged in the kind of collaborative inquiry that has the potential to create conceptual change and knowledge creation. At the same time, the use of data and the way it was to be used was being mandated by the district, with the potential that schools would move into a compliance mode rather than engaging in collaborative inquiry to think about their local issues. This process could derail some of the hard thinking work that needs to happen among teachers as they use data to challenge and rethink their beliefs and their practices.

At a systemic level, measuring progress and having targets was now part of the landscape that was mandated by the district, based on the provincial direction. The recommended data sources now extended beyond the provincial data to include district data, and even classroom data generated by teachers.

Just set your targets. This is what you are going to use. We sent them a profile of their school. This is your DRA. Here's the template. Get your IRAs out from EQAO. What do you know about that? What do your data walls say? All of these sorts of things. If they are not very sophisticated in how they use data, they certainly know now they are going to use data and don't tell me you don't know how to use the technology. [SInt06SA8]

We have always told them to use data but they have never really been given you must use this data. We said, you've got DRA. You've got EQAO. You have your own teacher designed performance tasks. That's still all out there. But this time we said thou shalt use this. So it was a commonality. [SInt06SA6]

Provincial assessment is important and we are going to measure that stuff. We are going to be accountable for it. So I think we'll see much more transparency and much more accountability which is the theme of the government, the Ministry. I just said to our people the other day, that's the reality. This is 2006. This is what it looks like. It's transparent and you need to account for what you are doing. And it is results based. So no longer, ya, I think. Demonstrate it. Show it. [SInt06SA7]

The system also required that schools set targets within their school improvement plans and measure their progress towards these targets.

We are going to measure it using EQAO and other pieces of data that we make available. Many people I think have the clearer message now. We need to set targets. We don't need to make predictions anymore. We need to have specific goals and targets. [SInt06SA8]

Now we have people looking at what is our school goal? Why are we choosing it? What evidence have we got to back up what we choose as our school goal. And then by September we're going to take a look at that plan and see. So that everything starts aligning and falling into place. [Sint06SA6]

We've studied the test results. Zeroed in on target areas. Along with our school growth plan, we've tried to evolve that around some of the areas we have seen for improvement. So we have definitely been targeting specific areas with our students and working on those to improve those areas. [SInt06:DDDT2]

The notion of accountability within the system was shifting as well. It was not enough to be accountable for improving scores but also for identifying specific areas needing improving and then taking the appropriate action, and even for the learning.

Now it's in terms of what's going on instructional wise in your school? What results are you getting? What demonstrations are there? There is, to me, much more accountability for the learning that's going on in schools. [Sint06SA7]

We've done a lot of work in terms of trying to have principals see that it has to be focused on what's good for kids and we are starting to look at results and what that really means. How do we use those results to try to drive our instruction and help us with our practice in each and every classroom. [SInt06SA8]

Principals indicated that they were following these mandates and that they were using the data with the staff to reflect on current practices.

There was never the next step that says, here's maybe what you could try to do to get better. And EQAO has provided us with some of those tools. And I know the item analysis exercises that we go through here at our

school we also do like looking at the item analysis. I pull in the literacy team, I pull in the support team, and although we have already had class reviews for this year in September, and then we have weekly PDTs, and then we have targeted students, and project literacy targeted students - the targeted students are our resource students to make sure they are not dropping through the net.

[Teachers] would go back into their departments, look at the data and say, ok, what are the trends? What can we do in our classroom to improve student learning? What could we do as a department? And, what do we want from our school to help us improve? Then they all individually made a presentation to the department heads and then to the rest of the school on what they were doing, how they interpreted their data.

Some teachers also commented on the way that using evidence was changing their thinking.

If I am teaching the way the curriculum is expecting me to teach and imparting the knowledge that I am supposed to impart by my provincial bosses, then at the end of the day the kid should know this. If I haven't done that, then they won't know it. So do it. I think it comes down to almost that simplistic. Teach what it is that I am supposed to teach. Teach it in a way that I have been instructed to teach it using the skill sets that I have been taught. I should get these results at the other end. If I don't then let's go back and look at why that didn't happen. [SInt06SA9]

In addition, the evidence was being used to change the culture and particularly to promote deprivitization of practice through collaborative inquiry.

What is really cool is that we get together as a group just my principals about once a month. We look at EQAO and we look at data walls and so on. If you go to all my schools now they are using the same format because they really like it. They talk to each other. [SInt06SA1]

Well, there are all different kinds of icon throughout the First Class (district e-mail) system. There are ways in which people can share knowledge just by sending e-mails or posting things. There also book clubs and book reading groups and that sort of thing through staff development. [SInt06:EEEEP]

Everybody in this building has worked really, really hard. We have a literacy team that has made several initiatives and we have done a school practice run with kids every year. We tutored kids. We have had lunch time programs. And we have documents that support literacy in all subject area. And our teachers have been very good at coming on board with that. In the past we have had Literacy Tuesdays. We have had a literacy week. And so everybody in every subject area is focusing on one of the literacy tasks that are required. [SInt06:Q1: I]

## **Summary – Using Evidence to Change Beliefs and Practices**

### **Using Evidence**

It is interesting to see the progression of attention to evidence within this district. The district is

similar to many school systems in this regard. Education systems are awash with increasing amounts of data, much of it collected at national, provincial or state levels. Other data are collected in and about schools, teachers and students. The stated purposes for all this activity are typically accountability and improving education systems.

Over the six years of this project, this district has moved from a time when there was almost no attention to data to a more institutionalised notion of using data as a part of their routine practice and the beginning of rhetoric, at least, about using evidence and collaborative inquiry to change practices. Over time, who decided data were important, the definition of data and the connection between data and action have changed dramatically, but gradually. Initially senior administrators decided data were important, and they defined data as numbers derived from the EQAO provincial testing. At this stage, it is clear that data has become a pervasive force and that schools are spending time thinking about data and trying to see what it means and how it can be useful to them. Although they are beginning to move beyond the provincial assessment data, the data sources are still largely external to the school or to classrooms.

### **Collaborative Inquiry**

As we have mentioned earlier, collaborative inquiry is much more than meeting as a group and sharing ideas. It is a systematic process for creating new knowledge in which a group works together in repeated episodes of reflection and action to examine and learn about an issue that is of importance to them. Engaging in collaborative inquiry allows 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. It is the foundation of conceptual change as individuals come across new ideas or discover that ideas that they believe to be true don't hold up when under scrutiny.

It was not until the third year of the project that there was any evidence that either the administrators or teachers were even thinking about how the data might inform their thinking. Throughout the latter years of the study there has been some evidence that some administrators and teachers were beginning to be involved in inquiry, either individually or collaboratively.

There was little or no evidence of the data being used to identify areas of concern or to challenge existing beliefs or practices about teaching and learning. School administrators became more interested in evidence mid-way through this programme of research, but still data often meant numbers and the concern was largely about accountability. Only in the most recent research reports was there any indication that data, reflection and action were being linked and it is not yet clear whether the system or the schools will actually move to the kind of collaborative inquiry that will challenge thinking and practice in ways that result in conceptual change.

Transforming data and evidence into new knowledge is not a simple process. It requires engagement in complex technical and interpersonal processes. Evidence of any kind does not speak for itself, but rather needs to be given meaning in ways that challenge existing assumptions about what counts as effectiveness and points the way towards changing activities to better serve students. This is likely to require a whole new set of skills and dispositions. It is not at all clear that this school district is yet at the stage in their learning that they can use data to transform their mental models in ways that fundamentally change practice.

## **Overall Summary**

This paper is one a series of papers that will examine the conditions through which system and school leaders can facilitate knowledge-creation within their organization. Obviously leadership practices were required and were changed through the required modifications to the various actions. Upon reflection, while the focus was evolving, it was the constant emphasis on the system focus or purpose (improving student learning) that provided the foundation for all of the other conditions. And it was the constant interaction between the various conditions that facilitated the movement towards being a knowledge-creation organization. It is this interaction that captures the complexity of the change process and these interaction are difficult to portray in written text. Hopefully, through this paper and the forthcoming ones on the other conditions, we can contribute to the dialogue on large-scale change by depicting the complexity experienced by one large Canadian school district.