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Structures and practices for knowledge-managing organizations

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Abstract

If educational institutions are to be knowledge-managing organizations, educational practitioners need to construct and reconstruct professional knowledge as they solve authentic problems of practice (Hoban, 2002). When educators are knowledge creators, it requires fundamental structural changes and new practices for school districts and schools. As Lam (1997, p. 977) suggests structures can define “how knowledge and skills are distributed and used”. Being a knowledge-creating organization is advanced when school districts align all their practices with a common and sustained goal (Freeze & Kulkarni, 2007) that reflects the primary purpose of an educational organization – student learning. Sustained and collective educational innovation (Aramburu & Sa´enz, 2007) can occur when individual educators connect their individual and school level authentic problems of practice (Hoban, 2002) to the system goal. As practitioners individually and collectively work to solve these authentic problems, they can create knowledge but this knowledge must be verified, shared and codified (Lam, 2000) so that others across, and beyond, the organization can share the accruing knowledge.

This paper examines the changes to structures and to practice necessary for schools and school districts to act as knowledge-managing organizations. Data from a longitudinal programme of research provides examples of alternative practices and the structural adaptations supportive of a knowledge-managing organization.

Keywords: Knowledge-management, leadership, restructuring

The pace of change is escalating in our society partly due to advances in information technology and the explosion of knowledge. Increasingly, managing and distributing knowledge is critical for successful economies and societies. Indeed, in 1996 OECD (p.18) reported that:

OECD countries continue to evidence a shift from industrial to post-industrial knowledge-based economies. Here, productivity and growth are largely determined by the rate of technical progress and the accumulation of knowledge. Of key importance are networks or systems which can efficiently distribute knowledge and information.

Making knowledge management the *raison d'être* of an organization is a paradigm shift similar to that of the industrial revolution. Rifkin (2000) suggested that while the industrial age emphasized the exchange of goods and services, knowledge-management societies engage in the exchange of concepts. In both paradigm shifts, the products of the past were still required: in the industrial age, people still needed agriculture to provide food and in the new knowledge-based economy, people need the physical products provided through industry (Stewart, 1997). Yet these paradigm shifts transformed both the agricultural society and the industrial society. In the same way, the knowledge-management paradigm is changing the current conceptual landscape, with knowledge being both a product and a tool.

Shifting from the industrial to knowledge based paradigm is having a radical effect on the future of primary schools and their school districts. School practices are evolving to reflect the norms of a knowledge-based society rather than ones that are more reflective of the educational requirements of the industrial age. Schooling, in the industrial age, required that individuals learned “basic skills that would prepare them to work in an industrialized manufacturing economy” (Bamburg, 1997, p. 2). Schooling for a knowledge-managing society focuses on creativity and innovation to face an accelerated and uncertain future. Thus, knowledge management is a critical skill set for the future and continual learning that must be incorporated into all aspects of society. Becoming knowledge-managing organizations could entail the restructuring and reculturing of all schools (including primary schools) and school districts to facilitate students entering into and contributing to a knowledge-based economy

This paper examines the necessary changes to structures and to practice for primary schools and school districts to act as knowledge-managing organizations that can aid students in acquiring and using such skills. While this paper is primarily conceptual, evidence from a longitudinal program of research provides examples of alternative practices and the structural adaptations supportive of a knowledge-managing organization.

Understanding the Language of the Knowledge Age

Increasingly, the process of creating and using knowledge is the focus of many different fields—especially that of the business and organizational development. This multi-disciplinary focus has made communication and dialogue problematic and has generated a multitude of different terms (see Levin, 2008, pp. 9–10 for an excellent depiction of the various terms currently in use) that are beyond the scope of this paper. This paper employs the conceptualization proposed by Lin, Wang, and Tserng (2006), although we have added “validation” to their definition of knowledge management. They suggested:

Knowledge management involves creating, securing, coordinating, combining, retrieving and distributing knowledge. (Cited in Levin, 2008, p. 10)

What is Knowledge?

Knowledge is no longer viewed as static and immutable but rather as a dynamic and ever-changing commodity that is constructed and tested by individuals as they seek solutions to new problems (Hoban, 2002; Hakkarainen, Palonen, Paavola, & Lehtinen, 2004). Bennet and Bennet (2008), for instance, defined knowledge as a creation of a human mind with the capacity to take effective action in different situations. Knowledge creation has become associated with innovation, and when organizations innovate, they ensure long-term success and growth (Edge, 2005; Lawson, Petersen, Paul, & Handfield, 2009; Smith, Collins, & Clark, 2005). Such interpretations are increasingly being promoted in the business and organizational development literature as maintaining a competitive edge and innovative practices are viewed as necessary to ensure the financial viability of an organization (Chang & Lee, 2008).

The fields of business and organizational studies are increasingly stressing the importance of tacit knowledge, with individuals and organizations possessing both tacit and explicit knowledge. Lam (2000, p. 490), for instance, maintained that explicit knowledge can be acquired, codified, and transferred through logical deduction, and “can be aggregated at a single location, stored in objective forms, and appropriated without the participation of the knowing subject”. In contrast, she argued that tacit knowledge is “intuitive and unarticulated”, “personal and contextual”, and acquired through practical experience. Including tacit knowledge has become critical in the definition of knowledge for the knowledge era. The business literature, in particular, maintains that innovative knowledge is created when individuals share their solutions (or tacit knowledge) to authentic problems (e.g., Lam, 2000; Nonaka & Takeuchi, 1995; Von Krogh, Ichijo, & Nonaka, 2000). Thus, tacit knowledge is portrayed as providing a competitive advantage because an organization’s core competency is more about the know-how (tacit) than the know-what (explicit) (Pathirage, Amaratunga, & Haigh, 2007). Tacit knowledge is subsequently regarded as a key resource in organizations because most of the valuable knowledge is embedded in people’s heads (Peroune, 2007), which reflects the notion of knowledge as a human creation. The danger is that without careful reflection and supporting evidence, tacit knowledge can reflect past know-how as opposed to innovative practices.

The meaning of knowledge in the public domain differs from the corporate perspective described above because their organizational purposes are different. Corporate organizations seek profit, while public organizations are responsible for some aspect of the common good. A focus on a common good for a given society can involve the education of its children or the health of its citizens, which, in turn, can engender caution of innovative practices.

Public organizations, including primary schools and their school districts, typically employ a bureaucratic structure (Mintzberg, 1989) with established action patterns. By their nature, bureaucratic organizations rarely foster innovative thinking that could challenge existing tacit knowledge or question the “black box” that frames their world views. However, too frequently this can lead to the continuation of status quo practices through a mechanistic world view of knowledge (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. However, a revised conception of knowledge and knowledge management is required if public organizations, such as primary schools and their school districts, are to meet their obligations to prepare their students to meet current and future needs.

While there is little information in the literature pertaining to knowledge management in the public sector (Andreas & Nicholas, 2006), there is a sense that the public sector is evolving and beginning to attend to the processes involved for knowledge management. According to Andreas and Nicholas (2006), the main drivers for the recent adoption of knowledge-management initiatives in the public sector are organizational cultural changes required to achieve: increased efficiency; ready access to knowledge repositories; improved accountability; and more cost-effective delivery of services for higher return on taxpayers' investment.

What is Knowledge Management?

According to Moteleb and Woodman (2007), knowledge management occurs through cycles of creation and acquisition; representation and dissemination; and validation, utilization, and renewal of purposeful knowledge. Within these cycles, acting as a knowledge-managing organization involves additional institutional practices designed to address the core dimensions of knowledge management. First, knowledge management is social (Boder, 2006), with an emphasis on collaboration between knowledge workers. Second, knowledge management involves continual learning for everyone within the organization (OECD, 1996). Third, knowledge management is also individual, with individuals identifying and questioning their mental models and increasing their capacity to learn (OECD, 1996).

Knowledge Management Is Social

Managing knowledge is a social process that involves a shift from an individual worker to that of a group focused on achieving the system goals for each of phase of the cycle. Thus, deep collaboration that is advanced through "joint work" (Little, 1990) and validates the emerging knowledge through the action/evidence/revision spiral (Earl & Hannay, 2009) facilitates innovation. As Von Krogh et al. (2000, p. 58) argued, working collaboratively requires that participants "dwell in the experiences, perspectives, and concepts of other participants – to shift from a commitment to one's own interest to that of the group". Practical innovations develop when knowledge workers purposefully interact in a group, through synergistic conversations (Chareonngam & Teerajetgul, 2008; Edge, 2005; Mengis & Eppler, 2008), to construct and share knowledge about their practice. It requires collaborative learning practices to promote the tacit knowledge dissemination that is critical for innovation (Wright, 2008). This process is iterative, dynamic, creatively chaotic, transformative, and it evolves through the interaction within groups rather than the musings of an individual.

Knowledge Management Involves Continual Learning

Senge (1990) argued that continual learning is the critical and desired state in a learning organization. Given that learning organizations manage knowledge, then continual

learning is essential. He linked continual learning and personal mastery, claiming that “people with a high level of personal mastery live in a continual learning mode. They never ‘arrive’. . . . It is a process. It is a lifelong discipline” (Senge, 1990, p. 142). In knowledge-managing organizations, organizational members need to develop skills in, and practice, reflection and inquiry. They need to learn from continually collecting relevant evidence, reflecting on that evidence, and revising their actions to reflect their learning. Knowledge-managing organizations ensure that individuals within the organization share the resulting learning and provide feedback to each other.

Knowledge Management Includes Reconsidering Individual Mental Models

Mental models are “deeply ingrained assumptions, generalizations, or even pictures and images that influence how we understand the world and how we take action” (Senge, 1990, p. 8). Often, mental models are reflective of the past and are shaped by tacit knowledge, experiences, formal education, and professional practices. Constructing new professional knowledge involves learning new ideas, information, or strategies (Levin, 2001), which can lead to a reconstruction of mental models (Duffy, 2003). As Duffy (2003, p. 31) argued:

If the individual cannot link the new information to an existing mental model, he or she may construct a mental model to understand the new information or discard the information as irrelevant, unimportant, or wrong.

Knowledge-managing organizations need to assist organizational members in questioning their individual and collective mental models in order to construct and validate new individual and collective tacit and explicit knowledge.

What is *Educational Knowledge Management*?

Social organizations, such as education, have been slow to manage knowledge supportive of changes to professional practice. Knowledge related to professional practice typically is socially complex knowledge with tacit and potential knowledge embedded into social practices. These forms of knowledge are highly contextualized and need to be shared through social processes. They cannot be acquired simply through direct means (Murray & Moses, 2005; Paavola, Lipponen, & Hakkarainen, 2004; Patrick & Dotsika, 2007; Yazici, 2005) such as the typically employed externally developed professional development programs.

Educators need to understand and to be able to articulate (for themselves and others) that they are knowledge creators, not just passive recipients of knowledge created externally. Educators create tacit knowledge about the best and the next educational practice and such knowledge requires validation. As a profession, educators need to enact the knowledge-managing components outlined by Lin et al. (2006): creating, securing, combining, retrieving, distributing, and validating knowledge. Moreover, as Fullan (2001) maintained, educators need to explicitly understand that they are managing professional knowledge. Yet he argued that school districts are not adept at being knowledge-creating organizations and he asserted “School systems, in any case, would be well advised to name knowledge sharing as a core value – and to begin to work on the barriers and procedures to dramatically increase its use” (p. 105). Hargreaves (2002, p. 225) also applied the business experience to education, and he argued that schools and school districts must create knowledge or be left behind:

In high technology firms, the importance of knowledge creation, not just its dissemination, is acknowledged, for to be content with current knowledge and practice is to be left behind. My thesis is that the same now applies to schools.

To act as knowledge-managing organizations, social organizations must create cultures and structures that promote the management of knowledge congruent with the purpose of that organization. For example, in an educational organization the purpose is the continual improvement of student learning, while in health organizations the purpose is the continual improvement of medical care. Innovation, for educators, is about learning to work differently in order to work better. For teachers, most innovation involves the creation of new professional knowledge about their work to advance student learning. Such insights can be facilitated through carefully designed professional learning interventions and through carefully facilitated professional dialogue. Such dialogue is dependent on the environmental culture and structure.

In order to thrive in a knowledge-based society, the organizational context must be supportive of knowledge management. This is critical, as the organizational context can promote or inhibit knowledge creation to provide a competitive advantage or it can act as a roadblock to innovation (Andreu, Baiget, & Canals, 2008). Leaders must attend simultaneously to both the culture and the structures of their organization as the organizational culture and structures are symbiotic (Prieto, Revilla, & Rodríguez-Prado, 2009). We first examine the supporting cultural attributes and then explore some structures facilitative of knowledge-managing organizations.

Cultures for Knowledge Management

Primary schools, and their school districts, require cultures and structures that allow them to operate as knowledge-managing organizations. Given the traditionally bureaucratic organizational structures of most educational systems (Hannay, 2003), senior administrators must create a culture supportive of all organizational members being knowledge workers who manage knowledge related to their role in order to advance the purpose of that organization—improved student learning.

Developing and then supporting such a culture is an encompassing process requiring consistent attention and action; sustained modelling (Hannay, Mahony, Blair, & Earl, 2006a & b); and time to enact. Indeed, Seng, Zannes, and Pace (2002, p.143) suggested that “a knowledge-friendly culture is an important aspect of any government or business’s knowledge management program”. A supportive culture is especially important in a social organization that operates as a professional bureaucracy because entry into that organization is predetermined by admission requirements and operates through the organizational hierarchical lines of authority.

Collaboration, as noted earlier, must be the cultural touchstone of educational institutions wishing to operate as knowledge-managing organizations. This shift can run contrary to the cultural norms of social organizations, which can exhibit a culture of resistance and knowledge hoarding (Edge, 2005; Syed-Ikhsan & Rowland, 2004). Additionally, the individualized knowledge culture and silo-like structure typical of social organizations can be barriers to knowledge sharing and creation (Burley & Pandit, 2008). Moreover, working as a collaborative entity can be a significant challenge and change for educational organizations, where the norm has been the teacher or school administrator as the

“lone ranger” (Lortie, 1975). A collaborative environment where knowledge workers feel safe to share and to explore their existing and alternative practices promotes the sharing of tacit knowledge that is essential for creating, validating, and disseminating knowledge. Collaboratively examining and questioning existing tacit knowledge can lead to innovative practices, but this can only be accomplished within a supportive culture.

Many educational organizations, both at the primary school and school district levels, will have implemented some of the necessary cultural and structural changes facilitative of knowledge management. But to create the necessary gestalt for the operation of a supportive culture, our research documents that all of the following changes must exist and be practised: trust, risk taking, experiential/experimental action, and knowledge sharing.

Feeling Safe

Social organizations, such as educational institutions, are hierarchical, with different levels of authority for different roles and with individuals having tacit knowledge related to their practice of these roles. If leaders expect workers to engage in the necessary social processes for knowledge sharing and creation, then they must create a work environment that maintains a culture of trust (Seng et al., 2002). To establish these cultures, policies and procedures must articulate the value of knowledge sharing and creation (Freeze & Kulkarni, 2007). Such policies and routines promote the alignment of individual and organizational mental models so that collective intelligence is fostered and innovations are promoted (Aramburu & Sáenz, 2007; Mariotti, 2007). Knowledge creation and sharing can only happen when organizations build a culture of relational trust among knowledge workers (Becerra, Lunnan, & Huemer, 2008).

As individuals work in groups to foster innovative changes to professional practice, they can challenge their existing mental model related to that practice and can interact with their colleagues with differing professional mental models. In order to explore and challenge past professional practices in a group setting, participants need to trust their supervisors and their colleagues. Our research indicated that building trust to challenge practice takes substantial time (Hannay & Mahony, 2005). Several school administrators said it took their school staffs two to five years to develop the trust necessary for individuals to take risks in revising their professional practice. It was only when teachers and school/district administrators began to collectively share “what worked” and “what did not work” that they began to construct contextually relevant knowledge. In year four of the school district change efforts, we first identified the critical process deprivatization of practice. We reported: “It is almost as if they had ‘deprivatized’ their practice through making it open to scrutiny with other educators. The deprivatization of practice represented a significant cultural shift for schools and the school district. A teacher explained the potential of such a significant cultural change” (Hannay & Earl, 2009, p.18):

We need to be able to move out of this egg crate type of system in the elementary school system and open it up so that we can then see what’s happening on the other side of the wall from my own personal classroom. . . . to learn a few things from each other. [SInt04:EET1]

To enact such deprivatization implicitly required that individuals had “permission to fail” but with the intent of learning. This is consistent with Smedlund’s (2008) assertion that

knowledge-managing organizations must voice the explicit expectation that mistakes are a part of a knowledge constructing process.

Taking Risks

Permission to fail also indicates that organizational members are taking calculated and intelligent risks to improve their professional practice. Intelligent risk taking is an integral part of learning and consequently an invaluable component of the organizational culture (Chan & Scott-Ladd, 2008). Individuals need to trust their colleagues and be willing to take such risks if they are to openly share and to question their tacit knowledge (Becerra et al., 2008). Working with colleagues might expose what you know or do not know about improving your practice. Quite possibly, taking intelligent risks might mean working differently than in the past and certainly this might be the case in order to operate as a knowledge-managing organization. In a hierarchical organization, such as in education, all levels of the organization might need to work differently.

In our research, the senior school district administrators came out of their departmental silos and collectively created a system team to guide school district change. This team provided the senior administrators with a learning space from which they could challenge each other and then take intelligent risks to advance professional learning aimed at improving student learning. Importantly, through their actions, the senior administrators modelled a trusting and intelligent risk-taking culture for their school administrators (Hannay et al., 2006a & b).

Through this process, school administrators felt supported in taking professional risks in their administrative practice. For instance:

More administrators [are] taking risks in the way they run their schools. . . .
They feel they've been given permission by their [supervisor] to try some things that are a bit risky, but lead to improved student learning. Also, perhaps, more dialogue and working together as a whole group in a school.
[SInt05:SSP]

In turn, school administrators modelled and then created a culture where teachers felt safe to take professional risks in order to improve their practice. The resulting safe culture allowed school staffs to collectively create and to share their professional knowledge related to their innovations to improve the learning of their students.

Trying New Ideas and Practices

Individuals are not passive recipients of new ideas or innovations. They seek them out, experiment with them, evaluate their value, develop informed opinions, and try and modify them to fit their particular situation, and they engage in these activities through dialogue with other users (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004). As noted earlier, complex learning cannot be achieved through direct means such as those traditionally provided by professional development sessions.

Thus, a culture supportive of knowledge management includes the interactive and dynamic process of action, evidence, and revision. The experiential/experimental process is an integral part of learning and consequently an invaluable cultural component in an

organization (Chan & Scott-Ladd, 2008). Taking action is critical to facilitate experiential/experimental learning. As Nonaka and Takeuchi (1995, p. 10) explained, “the most powerful learning comes from direct experience”. Von Krogh et al. (2000, p. 27) maintained that knowledge is “ultimately tied to action” when focused on solving an authentic “problem of practice” (Hoban, 2002). Further, evidence must be collected (Earl & Katz, 2003) and analyzed on that action as this process can spawn a reflective spiral (Earl & Lee, 1998; Supovitz & Klein, 2003)—especially if the evidence challenges tacit knowledge. The addition of action learning includes the important cognitive dimension that recognizes if individuals fail to associate their actions with the results, then learning will be superficial and unsustainable (Booth, Sutton, & Falzon, 2003).

When trust and risk taking were incorporated into school district culture, individuals could accept the invitation to engage in experiential learning. In our longitudinal study, we documented numerous quotes from both school administrators and teachers about having permission to engage in experiential actions with the express purpose of improving student learning. A school administrator described the experiential professional learning that was being facilitated (Hannay & Earl, 2009, p. 24):

We’re all experimenting. I told them that. You’re allowed to fail. It doesn’t matter. You just have to go and try. If it doesn’t work, then just go next door and say, By George, what the heck. I tried that and it didn’t work. Did you do it? Did it work? What did you do? [SInt05:VVP]

Individual educators and school staffs were engaged in the action/evidence/revision spiral. As they engaged in this process, they constructed knowledge that they need to share with other professionals in order to operate as knowledge-management organizations.

Sharing Knowledge

Knowledge management is a social process that requires collaborative sharing and questioning of ideas in order to construct relevant contextual professional knowledge. Collaboration is central in corporate strategies that aim to identify and leverage knowledge assets to promote process improvement and product innovation that translates into organizational performance capacity (Malik & Malik, 2008). These strategies compel individuals to make sense of current ways of understanding and to develop new links between mental constructs through relevant dialogue, discourse, and intellectual dispute in the workplace (Gifford & Agah, 2009; Peroune, 2007; Subramaniam & Youndt, 2005).

Working collaboratively is critical for knowledge management as it fosters collective learning, which, in turn, facilitates collective intelligence among the knowledge workers (Aramburu & Sáenz, 2007; Boder, 2006). As groups work collaboratively, they negotiate a shared culture and establish shared group assumptions. Such a safe group culture can provide the knowledge space where the knowledge workers can engage with their colleagues in knowledge sharing (Sackman & Friesal, 2007). Knowledge sharing is a social process in which individuals share their insights and tacit knowledge, which requires that they voice or verbalize ideas. When this happens within a supportive culture, participants can generate additional ideas and all ideas are open to questioning. Von Krogh et al., (2000, p. 8) suggested that:

... individuals share their personal beliefs about a situation with other team members. At this point, justification becomes public. Each individual is faced with the tremendous challenge justifying his or her beliefs in front of others and it is this need for justification, explanation, persuasion and human connectedness that makes knowledge creation a highly fragile process.

Thus, knowledge sharing is facilitated through professional dialogue that encourages participants to challenge their professional perceptions. Healy, Ehrich, Hansford, and Stewart (2001) concluded that a well-designed conversation is an effective strategy to foster learning because the participants are engaging in sense-making by articulating their mental models.

Participating in safe professional dialogue can allow individuals to challenge their perceptions or their own mental schema because such a dialogue provides other perceptions and this can create a sense of disequilibrium. Such social processes become the venue through which individuals learn, and participants develop, common understandings and collective intelligence (Boder, 2006). Hence, when individuals share, create, and integrate knowledge, they can change their collective thinking through synergistic conversations with one another (Chareonngam & Teerajetgul, 2008; Edge, 2005; Mengis & Eppler, 2008). In practical terms, organizations innovate when they hold a high capacity for knowledge accumulation, knowledge sharing, and collaboration (Chang & Lee, 2008).

Perhaps the tendency for social organizations to hoard knowledge and be less collaborative, as previously discussed, results in knowledge sharing being more problematic for individuals in those organizations. While such a process was still emerging and took time to be facilitated, our research documented that knowledge sharing was occurring within the schools and school district studied in our research. The increased professional dialogue was apparent in evidence collected from the senior and school administrators and from the teachers. Key was the deliberately planned increase in professional dialogue with the expectation that participants share their knowledge about “what worked” and “did not work”. Through this process of deprivatization, educators began to question and to adapt their mental models related to their administrative or teaching practice. By supporting the embedded professional dialogue (as examined in Hannay & Earl, 2008), school and district administrators were “managing the conversation” (Von Krogh et al., 2000) through social processes that promoted knowledge creation and sharing.

When results from evidence generated through the experiential/experimental spiral are shared through sustained collaborative interactions, innovations to professional practice are facilitated. Yet, perhaps, knowledge sharing and the experiential/experimental spiral are the weakest cultural attributes of knowledge management for social organizations because of their bureaucratic structures. Quite possibly, for social organizations, existing organizational structures need to be reshaped to create structures that provide opportunities and expectations of knowledge management within the organizational structure itself.

Constructing Opportunities for Knowledge Management

In the corporate world, successful knowledge management can provide a competitive edge to increase the profits of a company. In social organizations, successful knowledge management can provide a means of achieving the common good discussed earlier. This is heightened when knowledge workers are engaged with authentic tasks connected to the moral purpose of the organization. For educators, improving student learning is the moral purpose

(Fullan, 2003) for educational organizations and this also reflects the “ethics of practicality” (Doyle & Ponder, 1977) typically espoused by educators. Managing knowledge related to improving student learning must be deeply embedded into primary schools and their school districts of the future. Esoteric ruminations alone are insufficient because learning for the sake of learning or knowledge sharing for its own sake are not relevant motivating factors (Zboralski, 2009).

Primary schools and their school districts need to provide *planned opportunities* for individuals to share and to explore ideas related to the authentic problem of improved student learning. These organizations must provide embedded opportunities to construct real-time solutions (Gifford & Agah, 2009; Leinonen & Bluemink, 2008; Liaw, Chen, & Huang, 2008) to authentic problems of practice (Hoban, 2002). Through providing social and sustained processes, organizations can support knowledge management (Bleakley, 2006; Jakubik, 2008; Ringer, 2007).

Educators need to realize and to vocalize that they individually create knowledge about their practice. This knowledge must be shared and validated through sustained and embedded organizational structures. Knowledge workers need to work on solving authentic problems of practice, collect evidence on their related actions, and then reflect on evidence collected through that action/evidence/revision spiral. When this process is collaborative and operated within a safe environment, participants can collectively challenge their tacit knowledge related to their past practice. Through this process, participants can construct relevant knowledge on new professional practices, challenge that knowledge through student learning evidence, and if the knowledge is validated, disseminate such contextual knowledge to their colleagues.

Indeed, educational organizations for the 21st century need embedded structures where collaborative knowledge management can be expected and practiced. Moreover, managing knowledge must become the modus operandi of the organization, with allocation of the necessary sustained and embedded organizational time. In our longitudinal research, the embedded opportunities (Hannay & Earl, 2008) for knowledge management both facilitated and were facilitated by: teamwork, deprivatation of practice, action/evidence/revision spiral, and professional dialogue.

Creating Knowledge Management Space in School Districts

School districts are public organizations that are typically professional bureaucracies (Mintzberg, 1989) that are compartmentalized and often have minimal interaction between the compartments/departments. In many ways, the relationship between school districts and their schools is similar to that of large corporations and their subsidiaries. In his study of the relationship between the cultural context and knowledge management, Lucas (2006) found that conflicts arise when value expectations are different and there has been no alignment of expectations. To avoid this problem, school districts must create and sustain a clear goal related to the organizational purpose that can connect to the goals of both schools and individual educators. For education, that organizational purpose is student learning. As well, school districts of the 21st century must provide intellectual space through which knowledge workers can experience knowledge moments. In a knowledge moment, knowledge is discovered, created, exchanged, or transformed into new knowledge (Dvir, 2006). When this occurs, individual and collective mental models are open to ideas, information, and constructs

(Garcia, 2006). Possibly, this might be the moment when sustainable change takes root in the individual or collective intelligence.

In addition to providing the organizational intellectual space and the opportunity for collective knowledge moments, senior administrators must both facilitate and model the cultural norms previously discussed. Casteneda and Rios (2007) suggested that such social modelling facilitates high levels of learning by capitalizing on observational learning and adaptiveness. Social modelling displays the thinking and actions of others and allows observers to learn the general rules for dealing with different situations (Bandura, 2000, 2003). An organization that values and encourages workers to share their practices with others promotes a knowledge-sharing culture (Tagliaventi & Matterelli, 2006).

Senior school district administrators set the tone and the expectations for their school districts and they can take action to encourage knowledge management. First and foremost, senior administrators can ensure that the school district goals reflect the organizational purpose: improved student learning. In our research, it was when the CEO of the studied school district introduced the slogan “make the main thing, the main thing” (with improved student learning as the main thing) that individuals within the organization began to change their practice and to manage knowledge. This slogan resonated with practitioners and they began connecting the system goal to their school and their individual goals.

Second, senior administrators can modify the organizational structure to create intellectual space where organizational workers can collaboratively work together to enact the system goal. This space provides a sustained opportunity for knowledge workers to engage in professional dialogue related to improving their practice in order to implement the system goal. Our longitudinal research provided several relevant examples of structural change. The senior school district administrators, figuratively speaking, left their departmental silos to work and to learn together. To do this, as described earlier, they created an organizational opportunity through which all senior administrators deliberated on options, took experiential action, analyzed evidence, and worked together to shape system direction. As they shared their questions and their learning from their experiential actions, senior administrators shifted the system focus from an esoteric vision to one that focused on improved student learning.

In another example, the senior administrators reshaped the monthly meetings of school level administrators to provide opportunities for knowledge sharing and professional learning. These meetings ceased being primarily managerial and became focused on professional learning with the goal of improving school practices in order to improve student learning. School administrators engaged in professional dialogue and through that medium, constructed and disseminated knowledge related to their administrative practice and school improvement efforts. Thus, the senior administrators restructured an existing organizational structure to provide a sustained opportunity for knowledge management.

Third, the importance of reflecting on individual and collective learning as a means of creating and validating knowledge must be a normal and acceptable practice in the school district. This can mean publicly sharing with other knowledge workers actions that are successful and unsuccessful. Our longitudinal research documented that the senior administrators modelled and publicly reflected on their learning processes (Hannay et al., 2006a & b). As they did this, senior administrators modelled several of the knowledge management processes identified by Lin et al. (2006), particularly: creating, securing, and disseminating knowledge. They also adapted their practices to focus on school improvement

to improve student learning. For instance, they created and used common templates to structure and record their professional dialogue with school administrators on the school improvement efforts in that school. Such templates could provide a means of collecting information and, once analyzed, this information could become knowledge that could be codified (Lam, 2000) and accessible throughout the organization.

The above examples are among many documented in our longitudinal research. The fundamental learning from this research is that these senior administrators had not added additional tasks or structural requirements to the organizational members. Rather, they had used existing opportunities differently to provide opportunities for knowledge management.

Creating Knowledge Management Space in Primary Schools

The knowledge-based paradigm shift requires a mindset shift for educators. School practitioners need to view themselves as knowledge workers who manage knowledge. Their shared moral purpose must be improved practice designed to help their students learn the skills required to thrive in the 21st century. As knowledge workers, educators need collaborative intellectual space where they can safely challenge ideas and constructs, and then explore and validate this new knowledge. Moreover, collectively, they need to employ an action/evidence/revision spiral to validate the effect of these new practices and ideas on improved student learning. This process requires ongoing intellectual space that provides sustained and generative opportunities for professional dialogue.

If educators are to be knowledge workers managing professional knowledge, then two a priori conditions must be met. First, it must be recognized that educators possess knowledge about teaching and learning—albeit tacit knowledge. Tacit knowledge plays a critical role in the complex change process. In Piagetian terms (Hoban, 2002), new ideas are filtered through past or tacit knowledge to determine whether the new knowledge fits into the individual's schemata. If the new ideas or information differs from an individual's past schemata, it is dismissed or new neural pathways are created to accommodate the new ideas (Nevills, 2003). Therefore, it is critical that this tacit knowledge be considered and validated through professional dialogue on the action/evidence/revision spiral with improved student learning as the desired goal. Such investigations can only occur if the cultural attributes previously described (trust, risk taking, experiential/experimental action, and knowledge sharing) exist and are practiced.

A second a priori condition is the expectation that educators must be engaged in knowledge management as conceptualized by Lin et al. (2006). Yet managing knowledge cannot just be added to the existing work nor can educators be expected to engage in such work on their own time or to collaborate with others only after the completing the normal working day. Rather, school organizational structures must provide the intellectual space for practitioners to engage in sustained knowledge management. Thus, similar to the structural adaptations required at the school district level, school operations need to be restructured in order to embed opportunities for knowledge management into the normal school organizational practices.

School practitioners need to focus their improvement efforts on authentic problems of practice (Hoban, 2002) related to improvement of teaching and learning reflective of the system goals. Thus, their efforts would focus on core issues of practice rather than being additional or extra activities. In order to manage knowledge facilitative of innovative practice,

educators need sustained and collaborative time embedded into the school organizational structures to engage in the professional dialogue required to conduct the action/evidence/revision spiral that can reshape their individual and collective mental models. The easiest way of providing the necessary intellectual space is to reshape the existing school-based activities to provide collaborative opportunities to address authentic problems and to manage emerging knowledge.

Schools have existing regular meetings that could be adapted to provide collaborative intellectual space for educators to manage knowledge. Schools could use existing staff meetings or divisional meetings to facilitate the professional learning that emerges from trying and then examining new practices. Through using the action/evidence/revision spiral in the regularly occurring meetings, educators can validate the tacit and explicit knowledge that is being created by implementing changes to their professional practices as to whether these new practices improve student learning. This would require a culture supportive of the deprivatization of practice as individuals must feel comfortable in publicly sharing “what worked” and “*what did not work*” in their practice. If such professional practices were validated (the action was either successful or unsuccessful in improving student learning), then knowledge would be created and retrieved. By embedding the sustained professional dialogue on this spiral into regular meetings, participants could create knowledge on issues related to their practice and to their context. Using organizational time signals that professional knowledge management is important to the organization. Moreover, if this knowledge could be codified (Lam, 2000), it could be disseminated to other educators in and beyond the system.

We learned a great deal about supporting educators in managing knowledge through our longitudinal research in an Ontario school district. We documented that, gradually, school administrators began using existing opportunities to engage teachers in creating and validating knowledge emerging from changes to their professional practice. It is essential that this process be interconnected and serve various real needs, as explained by a school administrator:

If we see the relevance or can connect it to a school goal or connect it to Ministry targets or to school improvement, and make that embedded in the daily lives of our teachers, then there are going to be results. [SInt06:AAAP]

Across the school district, primary school administrators adapted their staff meetings to ensure “Half of my staff meetings are professional development” [SInt05:SSP] and this provided an opportunity to embed knowledge management into normal school practices. Providing this intellectual space “kept us [primary teachers] talking about what we’re doing. Sharing what we’re doing and learning” [SInt05:RRT1], which meant teachers were “sharing their practices. They’re sharing what didn’t work and how could they do this differently” [SInt05:UUP]. Thus, staff meetings provided an intellectual space where teachers could safely share and validate emerging knowledge. As well, other opportunities were sought to adapt normal school practices to provide intellectual space related to improving student learning. Consistently, our research noted that divisional or department meetings were adapted to provide such opportunities for teachers to share their professional learning. For instance, a teacher described the new normal in a divisional meeting: “This is what we did last time. We’re going to try and apply this in our classroom. What do you think?” [Sint05:RRT2].

Our work also indicated that such adaptations to the school organization had to be consistent and sustained. This was critical, as we documented that it took several years for the required relational trust to be accepted as the norm and for some teachers to be knowledge workers who managed knowledge.

While adapting existing meetings could provide some opportunities for knowledge management, they are not sufficient by themselves for educators in primary schools to manage knowledge. If primary schools of the 21st century are to engage in knowledge management and to prepare their students to thrive in a knowledge-based economy, then the school structure needs to be modified to provide sustained opportunities for knowledge management. Practitioners must both question existing and create new knowledge related to improving educational practice in order to improve student learning. There must be intellectual space for school practitioners to engage in such deliberations together and this must occur in school time.

Our research indicated that some school administrators were incorporating the use of collaboration and intellectual space into the normal school days, for example, providing a common planning time for teachers of the same grade. As well, in other instances, school administrators released teachers from their classrooms so that professional learning opportunities could occur during the regularly scheduled school day. To achieve the maximum benefit, the professional dialogue and resulting action plans must reflect the core organizational purpose and, for education, that is improved student learning. As a school administrator reflected, “If you can put those structures in place so that the teacher feels like they can actually change the learning strategies because they know that that’s going to help that child, and everybody else wants that child to succeed, then . . . it just starts rolling and rolling and rolling” [SInt06:BBBP]. While the embedded professional dialogue is a crucial engine to promote knowledge-management practices, it is critical that participants validate, through the action/evidence/reflection spiral, that their actions are improving student learning. When there is evidence to support such assertions, educators will gradually shift their mental models to include the new practices.

Maybe some of the organizational methods employed in the private sector now need to be used in the public educational system. The literature emanating from both the business and organizational development literature report that such alternative practices as networks, communities of practice, and project teams are effective in facilitating a tacit-to-tacit knowledge transition (Pitt & MacVaugh, 2008). While each of these provides different structures, a common attribute is that they create a location for knowledge workers to interact so that they can offer and create new solutions together. A successful learning group will generate more knowledge, with the whole greater than the sum of the parts. Yet these organizational structures can prove difficult to sustain (Pathirage et al., 2007) when the “idea champion” (Lieberman, 1988) leaves the organization.

Primary schools of the 21st century need sustained intellectual spaces within the school day through which teams of educators can construct and validate emerging knowledge related to improving student learning. This relationship is critical. James, Dunning, Connolly, and Elliot (2007) found, in their study of 18 successful Welsh schools, that the key success factor to collaborative work of teachers was a focus on the primary task of improving student learning. In our study, when teams of teachers and school administrators worked together to implement changes to instructional practice, they began changing their practice. As a school administrator explained, “The focus is definitely on team learning. Giving time for people to do it during the day” [SInt06:EEEP].

So, the primary schools of the future need to facilitate teams of educators working collaboratively to identify actions that can advance student learning. As this process unfolds, they will construct and then validate new professional knowledge that can guide their practice and be disseminated with other professionals. Additionally, both informal and formal leaders need to “manage the conversation” (Von Krogh et al., 2000) of these intellectual spaces in order to facilitate individuals experiencing knowledge moments that could ultimately reshape their individual and collective mental models. However, it is well beyond the scope of this paper to explore the required leadership practices

Conclusion

The advent of the new millennium failed to produce the forecasted apocalypse. Yet, this young century is signalling we are experiencing a paradigm shift that will reshape our society, including the practices in primary schools and their school districts. Although future historians will have a clearer perspective, we are in the midst of a paradigm shift from that of an industrial economy to that of a knowledge-based economy. As noted in this paper, the very meaning of knowledge is being or has been reconceptualized and this has huge ramifications for educational organizations and practices. In Canada, and perhaps globally, we need to break away from our past mental models about: how primary schools and their school districts are organized and operate; the work of teachers and administrators; and even what constitutes good teaching and learning practices.

Primary schools and their school districts need to focus on knowledge management practices and skills for staff members as well as for children. Educators need to be perceived as and to act as knowledge workers who generate knowledge about their practice. Moreover, they require strategies to ensure that this knowledge is continually challenged and revised through the use of a action/evidence/revision spiral. This means the primary schools of the 21st century must deliberately balance the expectation for managing professional knowledge with providing opportunities for such activities within normal educational practices.

To function in the knowledge-based economy requires different organizational structures and ways of operating for primary schools. Individuals wanting to transform their organization to manage knowledge need to identify existing and new opportunities that could provide the intellectual space through which knowledge workers could experience knowledge moments and engage in knowledge management. These opportunities will differ by context, but each context can provide the structural opportunities through which they can embed knowledge management into the organizational fabric. The organization of the school day might cease to resemble the egg-carton image popularized by Sarason (1982). Most likely, old practices will either be radically transformed or discarded, but this is the norm in a paradigm shift.

While individual primary schools can practice knowledge management and can facilitate innovative practices to improve student learning, it is highly unlikely that individual schools can sustain such practices in isolation. Yet primary schools acting alone are unlikely to sustain the required adaptations, as the school district provides the organizational umbrella through which individual schools and their staffs operate. Adapted or new organizational structures, for both primary schools and their school districts, are required to provide ways that educators can share, question, and validate emerging professional knowledge. It is almost as if a spider web of connections needs to exist with links made within and between organizational units. But such a structure requires longevity because of the time required to

create the relational trust required to question professional practice. Too often, rather, short-term organizations are created, but typically these structures lack jurisdiction to initiate, support, and sustain substantial changes to practice. Another issues involves “scaling-up” (Elmore, 1996), the innovation from one eager and successful primary school to become the normal way that all schools operate in a given jurisdiction.

School districts, or their equivalent, could provide the organizational means to support the required knowledge-management practices, but this will require adaptations to the traditional bureaucratic structures and practices. As demonstrated in this paper, it is critical that senior school district administrators ensure that both policy and organizational practices foster knowledge management. As well, operating within the knowledge-managing paradigm requires the previously discussed cultural changes be practiced at the school and school district levels. Certainly, such organizational changes will necessitate deep changes to current practices that will encounter resistance from individuals and groups as well as challenge contractual arrangements. Facilitating such a new organization will require a visionary perspective in order to foresee the required structural, operational, and cultural changes.

However, surviving and thriving in the knowledge-based society might require such changes so that the current educational organizations avoid the problems identified in the *Saber-tooth Tiger Curriculum* (Peddiwell, 2004). In that book, schools kept teaching: fish grabbing-with-the-bare-hands, horse-clubbing, and saber-tooth-tiger-scaring-with-fire long after the fish, the horses and the saber-tooth tigers had disappeared because these skills were traditionally taught. Perhaps now, similar to the saber-tooth curriculum, educators need to challenge whether the existing structures and conceptions of knowledge emanating from the past can and will reflect the needs of children and educators living and working in a knowledge-based society.

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