The Leader's Role in Strategic Knowledge Creation and Mobilization

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Abstract

The purpose of this paper is to explore how leaders influence knowledge creation and mobilization processes. As a basis for the theoretical framework, the researcher selected theories that informed the investigation of this influence: leadership theory, knowledge theory, learning theory, organizational learning theory, and organizational knowledge creation and mobilization theory. A pragmatic paradigm and mixed methodology was utilized as a valid and reliable approach to engaging with system leaders, principals, and educators to develop an in-depth understanding of knowledge creation and mobilization processes. Districts and elementary schools participating in this study were selected after being identified as high-performing based on student achievement as compared to socio-economic factors. The following participants were involved in this study from Ontario, Canada: 11 principals, 11 teacher leaders, 26 teachers, and 5 system leaders. Based on the study results, four themes surfaced from the analysis of the qualitative and quantitative data: inquiry; learning beyond the boundaries; collaboration; and focus. These findings were further analyzed based on the theoretical framework of this study. The resultant significant findings are highlighted under the following themes: the importance of data; priorities, alignment, and tension within systems; and time factors.

Purposes

System and school leadership has continued to be a focal point of many provincial/state, district, and school initiatives based on the belief that leadership can positively affect improved student achievement. For the most part, this positive influence has been thought to be indirect (Hallinger & Heck, 1996). Leaders indirectly affect student achievement by directly supporting organizational learning and investigations of effective instructional practices (Mulford & Silins, 2003). For example, school leaders directly support the professional learning of teachers by providing time for collaboration and inquiry, identifying areas of need, accessing expertise, facilitating resources and so on. Through these supportive practices, teachers investigate strategies to target teaching and learning based on the assessment of students and alter instruction appropriately. The ongoing assessment of students provides teachers with opportunities to identify the needs of students and use data to inform changes in instruction (Erickson, 2007).

In attempts to advance systems of effective teaching and learning, educational forums have required student achievement data to be used under the premise of promoting transparency and accountability (Earl, Watson, & Katz, 2003; Ikemoto & Marsh, 2007; Shen & Cooley, 2008). It appears feasible that making evidence-based decisions at the school, system, province/state and global level will continue to be relevant as evidenced by the wide-spread and highly influential government policies and programs such as the United State's *No Child Left Behind policy* and the United Kingdom's *National Literacy and Numeracy Strategy* (Fullan, 2009). In the Canadian context, Ontario Ministry of Education documents and provincial targets include the concepts of 'raising the student achievement bar' and 'closing the student achievement gap'. Using district and provincial data, ambitious targets have been proposed for improved literacy and numeracy outcomes for elementary students and increased graduation rates for high school students (Ontario Ministry of Education, 2008).

For the purposes of this study, knowledge creation is considered a social process on the part of educators. Knowledge creation occurs when educators draw on their beliefs and understandings, synthesize information, and prepare for action (Ackoff, 1989; Breiter & Light, 2006; Nonaka, Toyama, & Konno, 2000). When collective groups of educators create knowledge, engagement and ownership of the process is enhanced. Therefore, knowledge is not forced on the collective; instead the group is active in the creation of the knowledge founded on their current knowledge base and context (Earl & Katz, 2007; Little, 2005).

As leaders and educational communities use data to inform evidence-based decision making processes, an organizational opportunity exists to support the creation and mobilization of knowledge. In order to explore effective practices and processes in support of knowledge creation and mobilization, this study enquired into the influence of school leaders in high-performing districts and elementary schools. Identifying these districts and schools involved factors such as performance on provincial assessments and socio-economic environments of school communities in Ontario, Canada. The questions posited in this study did not focus on whether leaders influenced student achievement, rather, *how* leaders directly or indirectly influenced the practices and competencies of others, in order to influence student learning outcomes.

Theoretical Framework

As there are numerous questions involving knowledge creation and mobilization processes, a theoretical framework provided lenses to view what was to be considered relevant within this study. Anfara and Mertz (2006) defined theoretical frameworks as "any empirical or quasi-empirical theory of social and/or psychological processes, at a variety of levels ... that can be applied to the understanding of phenomena" (p. xxvii). Merriam (1998) and Miles and Huberman (1994) noted the significance of theoretical frameworks to support the researcher in

determining what data should be gathered and what is important within the data gathered. The theories of leadership and learning founded the theoretical framework for this study and offered lenses for viewing the phenomena of knowledge creation and mobilization: leadership theory, knowledge theory, learning theory, organizational learning theory, and organizational knowledge creation and mobilization theory. A brief overview of the theories is provided.

- *Leadership Theory* – particular core leadership practices align with knowledge creation and mobilization processes. These practices indirectly or directly influence student achievement. The following leadership practices were utilized in this theoretical framework: setting direction; supporting the enhancement of instructional practices and monitoring student achievement; and building collaborative cultures; restructuring environments; and supporting professional learning (Louis, Leithwood, Wahlstrom, & Anderson, 2010; Marzano & Waters, 2009; Robinson, Hohepa, & Lloyd, 2009; Snipes, Doolittle, & Herlihy, 2002; Togneri & Anderson, 2003).
- *Knowledge Theory* – information processing includes cognitive processes, attention, and memory structures (Snowman, McCown, & Biehler, 2009; Driscoll, 2005; Marzano & Kendall, 2007; Woolfolk, 2009). Metacognition is also an important component of thinking, in which individuals reflect upon and understand their own thinking (Marzano & Kendall, 2007; Marzano et al, 1988). Systems of thought involve the cognitive system, metacognitive system, and self-system. Engagement with new tasks is determined by individuals as the cognitive system (e.g., knowledge utilization) and self-system (e.g., beliefs) are accessed. The metacognitive system is utilized in conjunction with the cognitive and self systems to set goals and monitor progress toward task completion (Marzano & Kendall, 2007). Polanyi (1962) considered two types of knowledge, explicit (i.e., externalized, codified knowledge) and tacit (i.e., unconscious knowledge), and how

these interact within individuals and knowledge creating groups. Through this interaction, knowledge conversion occurs (i.e., socialization: tacit to tacit, externalization: tacit to explicit, combination: explicit to explicit, internalization: explicit to tacit) and new knowledge is created (Nonaka & Takeuchi, 1995).

- *Learning Theory* – learning theories are an essential component of knowledge creation and mobilization. The underpinnings of adult learning include self-directed learning (Merriam, 2001) and andragogy (Knowles, 1980). These provide the foundation for learning theories such as transformational learning, a process of reflecting on the assumptions associated with the thinking and actions of individuals and groups (Mezirow, 1997, 2003). Learning theories are also described as experiential learning (Kolb, 1984; Weil & McGill, 1989), and single- and double-loop learning (Argyris & Schön, 1996). Social learning theory includes aspects of information processing theory, yet extends to learning that occurs through social interaction with others. This includes social cognitive theory (Bandura, 1962, 1986), as well as social constructivist theory (Vygotsky, 1978).
- *Organizational Learning Theory* – the requirement of learning to extend beyond the individual and become part of organizational practices is necessary for organizational learning to occur. Components of organizational learning research consist of processes of organizational learning (Levinthal & March, 1993; Levitt & March, 1988), learning organizations (Argyris and Schön, 1996), organizational inquiry (Isaacs & Senge, 1992; Schön, 1983; Sterman, 1994, 2006), communities of practice (Wenger, 2000; Wenger et al., 2002), and challenges to organizational learning (March & Olsen, 1975; Kim & Senge, 1994). At the core of organizational learning includes the premise that organizations are founded on the collective efforts of individuals.

- *Organizational Knowledge Creation and Mobilization Theory* – knowledge creation and mobilization is considered through the theories of Breiter and Light (2006) and Nonaka and Takeuchi (1995). Breiter and Light (2006) conceptualized transforming data into knowledge based on the work of Ackoff (1989) and Drucker (1989). As data were given meaning, the resultant information was then synthesized for the purpose of making decisions and preparing for action. Nonaka and Takeuchi (1995) detailed the mobilization of newly created knowledge within an organization. Knowledge was created through knowledge conversion modes, an interaction of explicit and tacit knowledge (Polanyi, 1962). Places called "ba" were required, safe places within the organization to create knowledge as this involved individuals and groups reflecting upon and at times challenging the status quo (Nonaka, & Tayoma, 2003, p. 6). Mobilization of knowledge occurred as knowledge was created and shared at various levels of the organization, a spiralling process of knowledge amplification (Nonaka & Takeuchi, 1995).

Based on the theories within this theoretical framework, the concept of knowledge creation and mobilization was viewed as a social process within and beyond the organization. Knowledge creation occurred when staff engaged as active learners, not only converting data to information based on their current context and understandings but also synthesizing the information to become actionable knowledge. Leaders supported conditions to mobilize knowledge across schools and districts by bringing groups of people together to create and share knowledge. When groups created knowledge, engagement and ownership of the process was enhanced. The new knowledge was founded on, and challenged by, the individual and collective understandings of data, processes and practices, perspectives, and context.

Knowledge Creation and Mobilization

Nonaka and Takeuchi (1995) detailed the mobilization of newly created knowledge within an organization. As part of an organizational knowledge creation theory, they explained knowledge as tacit and explicit. As groups of people collaborated together, these types of knowledge interacted with the creation of new knowledge as an outcome, a process called knowledge conversion (Nonaka & Takeuchi, 1995). Although it was important that knowledge conversion occurred at each level of the organization, it was also necessary for the knowledge created to move between levels of the organization and beyond. Mobilization of knowledge occurred as knowledge was created and shared at various levels of the organization, a spiralling process of knowledge amplification. New knowledge was transmitted through an organization and moved from the individual "through expanding communities of interaction, that crosses sectional, departmental, divisional, and organizational boundaries" (p. 72). Similarly, Katz, Earl, and Ben Jaafar (2009) pointed out the importance of *two-way flow* of knowledge creation and sharing between a school and a network of schools. In a process of uploading and downloading ideas and practices between the two, knowledge creation was shared. In effect, knowledge was amplified as individuals worked together in schools and schools worked together in networks, for the purpose of challenging the status quo and identifying next-step practices within a culture of change.

In consideration of amplifying knowledge creation and mobilization, Von Krogh, Ichijo, and Nonaka's (2000) work focused on micro-communities of knowledge. Similar to Lave and Wenger's (1991) communities of practice, the challenge for the organization was moving beyond micro-communities of knowledge developed based on shared interest. Harris (2008) highlighted two key dynamics of amplifying knowledge throughout an organization: 1) externalization of tacit knowledge and 2) movement of knowledge through an organization (i.e., individual, group,

organization, and inter-organizational). Nonaka and Takeuchi (1995) described a process of cross-levelling in which new knowledge was transmitted through an organization. This occurred as individuals from different levels of the organization interacted with one another. However, when considering the mobilization of knowledge and effective practices, Fullan (2001) admitted that "identifying the practices usually goes reasonably well, but when it comes to transferring and using the knowledge, the organization usually flounders" (p. 79). In Argyris and Schön's (1974) theory of organizational learning *double-loop learning* was also identified as a challenging process. An essential ingredient of double-loop learning involved individuals attempting to become better at learning from the beliefs associated with their own actions. This was a difficult task as it required reflection on how an individual reasons and moves forward with action. Therefore, if the outcomes from an action were not positive, the individual was required to reconsider both reflective and decision making processes.

Methods

The researcher chose to utilize a pragmatic paradigm and mixed methodology. Pragmatism is oriented toward finding solutions to problems and indentifying the consequences of actions (Creswell, 2009; Patton, 1990), therefore, researchers are able to choose from a variety of "methods, techniques, and procedures of research that best meet their needs and purposes" (Creswell, 2009, p. 11). The researcher was not restricted to a single research approach as multiple approaches are endorsed in mixed methods research (Johnson & Onwuegbuzi, 2004). In this single study, qualitative and quantitative data sources were gathered, triangulated, prioritized, and integrated for the purpose of analysis and generation of findings (Creswell, 2009; Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2006). In doing so, identified deficits of any one method were ameliorated by the inclusion of other methods. A mixed methods study was chosen by the researcher as a valid and reliable approach to engaging with system leaders,

principals, and educators to develop an in-depth understanding of knowledge creation and mobilization processes.

In this study, triangulation was the major mixed methods design identified by the researcher as most beneficial to answer the study questions (Creswell & Plano Clark, 2007). By utilizing a triangulation design, the researcher was able to seek "convergence and corroboration of results from different methods and designs studying the same phenomenon" (Johnson & Onwuegbuzie, 2004, p. 22). Two triangulation models presented by Creswell and Plano Clark (2007) were merged to form a model of qualitative and quantitative data convergence, as well as the transformation of qualitative data into quantitative data. All participants took part in both qualitative and quantitative data collection (i.e., questionnaires and interviews).

An important consideration of a mixed methods design involves the priority and importance associated with the qualitative and quantitative data (Morgan, 1998; Plano Clark, 2005). For example, if qualitative data was prioritized above the quantitative data in a concurrent model, the following notation would be provided … QUAN + qual. In this instance, qualitative data would be used to describe a portion of the investigated phenomena that cannot be quantified (Johnson & Onwuegbuzie, 2004; Plano Clark, 2005; Plano Clark, 2005). In this current study, the quantitative and qualitative data were collected and analyzed with equal importance, i.e., a QUAN + QUAL. Therefore, the qualitative and quantitative paradigms received equal status throughout the mixed methods design.

One of the challenges of mixed methods research includes the relative infancy of the field in debating the complexities of validity and reliability, as well as developing models to identify threats to internal or external validity (Onwuegbuzie & Johnson, 2006). Historically, quantitative research has embedded the concepts of reliability and validity. Conceptualizations of validity included descriptions of internal and external validity. Internal validity involved the

determination of cause-effect relationships based on the manipulation of independent variables. The generalizability of the results to other contexts beyond the study encompassed external validity (Onwuegbuzie, 2000; Yin, 2009). Reliability was based on the capacity to replicate the results of a study (Golafshani, 2003). The concepts of validity and reliability within qualitative research are often synonymous in nature, primarily denoting the desire to demonstrate credibility, transferability, and trustworthiness (Golafshani, 2003). Onwuegbuzie and Johnson (2006) proposed a term of *legitimation* as a way of using a bilingual nomenclature to act as a bridge between the qualitative and quantitative research terms (Teddlie & Tashakkori, 2003). The concept of legitimation was outlined through nine different types of legitimation. For example, *sample integration legitimation* required the researcher to consider "the extent to which the relationship between the quantitative and qualitative sampling designs yields quality meta-inferences" (Onwuegbuzie & Johnson, 2006, p. 57). Thereby, inferences made through the qualitative and quantitative data sets were combined to provide a coherent description of the analysis (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2006). This form of legitimation was evident in this current study based on design. Both the qualitative and quantitative data were gathered from the same participants, thereby identical sample populations. Prior to individual and focus group interviews, each participant completed a questionnaire. Therefore, the integration of the data types was not problematic and meta-inferences between the data components could be justified. The researcher also used *inside-outside legitimation* (e.g., representation of views from participants and researcher) and *conversion legitimation* (e.g., quantification of qualitative data) to promote validity and reliability within this mixed methods study.

Sampling

Boards and elementary schools participating in this study were selected after being identified as high-performing based on student achievement as compared to socio-economic factors. The researcher was interested in identifying those performing beyond what might be expected based on socio-economic factors. This *purposeful sampling* of districts and schools was followed in order to gain a rich understanding of the influence of leaders on the creation and mobilization of knowledge within and beyond schools (Creswell & Clark, 2007). Regression analysis applied to provincial Education Quality and Accountability Office (EQAO) scores (i.e., three-year EQAO aggregate score of reading, writing, and mathematics) and socio-economic status scores (i.e., parental education and parental income aggregate) resulted in an R-squared value of 0.3636. The differential between the district EQAO aggregate score and the regression line was calculated for each district. Only districts that attained at least three percent higher EQAO scores than the regression line based on socio-economic status were considered for this study. Participating high performing schools required an attainment of at least 9% higher EQAO scores than the regression line. Once three districts confirmed participation in this study, a shortlist of possible elementary schools was determined by provincial EQAO assessment results and socio-economic status of population. High-performing schools were invited to take part in the study. This resulted in four participating schools (i.e., principal and educators participated in on-site data collection) and seven additional principal participants (i.e., principal participation only). System leaders were also invited to participate, those associated to the schools chosen for on-site data collection. The potential participants were contacted through an introductory letter inviting their participation. This resulted in a total of 53 participants:

- 11 principals were randomly selected from a shortlist of high performing elementary schools;

- 37 educators voluntarily participated from four high performing schools including 11 teacher leaders and 26 teachers; and
- 5 system leaders voluntarily participated based on system-level positions such as superintendents responsible for the supervision and/or support of school staff and functions.

The researcher did not have a professional authority relationship with any of the participants, nor did the researcher previously work in any of the participating districts.

Data Collection Tools

A district document review took place prior to the collection of individual and focus group interview data in each district. This review provided a general overview of leadership practices that support data usage and knowledge creation through processes such as monitoring student achievement and supporting professional learning. For example, a board may provide specific assessment literacy training to new vice-principals. This type of professional learning requirement may be found in a district improvement plan posted on the district website. Documents for review included district websites, board of trustee meeting minutes, district improvement plans, director annual reports, school websites, school improvement plans, and school newsletters. The information gathered though this process supported in the refinement of follow-up questions that were available during the semi-structured individual and focus group interviews.

The questionnaire items, as well as the individual and focus group questions, were specifically developed based on the theoretical framework of the study. The researcher reviewed previous research for variables aligned with leadership practices and knowledge creation and mobilization processes. The researcher developed items based on these variables and followed item writing guidelines to help the participants successfully complete the questionnaires. This

included ensuring the language used in the items was simple, avoided uncommon terminology, and requested opinions on topics the participants would be expected to understand (Cox & Cox, 2007). Each questionnaire item was presented to participants in a standard format "5-point Likert-type scale about the extent to which they agreed that the item statements were true for them" (Leithwood, Patten, & Jantzi, 2010, p. 684). The items and questions were also modified and aligned to the position held in the district (e.g., system leader, principal, teacher leader/teacher). Further, the questions were aligned to questionnaire items and allowed for detailed descriptions of the perceptions of participants (refer to Table 1). Through the individual and focus group interview process, participants were able to share their extensive experiences related to the focus of this study. The interviews were *semi-structured* in nature to allow the researcher to ask follow up questions to gain a deeper understanding of the answers provided to each question (Willis, 2007). The resultant descriptions made available a narrative pool of "perceived causal inferences and explanations," (Yin, 2009, p. 102).

Table 1:

Questionnaire Item and Interview Question Samples

Role	**Questionnaire Item** ***(5-Point Likert Scale)***	**Interview Questions** ***(Individual and Focus Group)***
Teacher/ Teacher Leader	There is assistance to improve my abilities to analyze student achievement data.	What support is provided to teachers and teacher leaders to make informed decisions through the interpretation of data?
Principal	There is assistance to improve my abilities to analyze student achievement data.	What support is provided to principals to make informed decisions through the interpretation of data?
System Leader	There is assistance provided to principals to improve their abilities to analyze student achievement data.	What support is provided to principals to make informed decisions through the interpretation of data?

All interviews were semi-structured in nature to allow the researcher to ask follow up questions to gain a deeper understanding of the answers provided to each question. The length of interviews ranged from 45 – 90 minutes (8 interviews in total), thereby permitting a focused conversation. Each interview was audio taped to allow for transcribing and review. These interviews provided the optimal opportunity to gain an in-depth understanding of each individual's conceptions of the processes in place to create and mobilize knowledge.

Focus group interviews afforded an opportunity to gather the perceptions of system leaders, principals, and educators in supporting knowledge creation and mobilization during a small group setting. The number of participants within any focus group can vary dependent on the context and information required. Depending on the topic and participants, smaller groups can be desirable, for example, when the topic being investigated is complex (Krueger, 1995; Morgan, 1995). Based on the complexities of knowledge creation and mobilization processes and in some cases the small size of school staff, the composition of the focus groups in this study was arranged to be small. Focus groups included two participants at the system level and two to six participants at the school level (12 focus groups in total). It was also important to consider any power dynamics within a group that could present a disadvantage to the collection of data in a focus group format (Marshall & Rossman, 2006). With this in mind, focus groups within this study consisted of peers with similar roles (i.e., system leader, principal, teacher leader, teacher). Thereby, participants in this study were not hindered by the presence of someone of positional power.

Data Analysis

The analysis of qualitative and quantitative data occurred concurrently leading to the results of both data sets. The researcher engaged in content analyses, working through the

process of coding the interview data. To legitimize the analysis of the individual and focus group interviews, the researcher engaged in an iterative process of reviewing interviews based on newly identified categories and themes (Anfara, Brown, & Mangione, 2002; Spiggle, 1994). Another researcher was also used to code four interviews to assess intercoder and inter-rater reliability (Kurasaki, 2000), resulting in an 88% agreement between the researchers. Through an iterative process of coding the interviews and identifying categories, themes and sub-themes, the researcher focused on an interpretive process of analysis and meaning making (Onwuegbuzie & Leech, 2004; Sandelowski, 2001). As the researcher reflected, reviewed, and analyzed the coded data, various categories were identified based on the clustering of similarities in content (Krippendorff, 1980). The categories were then analyzed to determine broad themes; commonalities throughout the categories based on meaning (Baxter, 1991; Polit & Hungler 1999). Each theme was analyzed by the researcher to prioritize the themes based on the perceptions of the participants in this study. The researcher was observant for confirmatory data to support confidence in the analysis of the results, however, conflicting evidence was also searched for by the researcher to help minimize researcher bias while interpreting the comparisons of the results (Onwuegbuzie & Leech, 2007).

Quantitative data was also analyzed based on the questionnaires through descriptive statistics (e.g., means, standard deviations, t ratios, P values). In this manner, the researcher was able to efficiently gather data that minimized researcher bias (Gillham, 2008; Oppenheim, 1992). Based on consistencies, the themes from the qualitative and quantitative data were combined to provide a more holistic description of the findings. As part of this mixed methods study, the conversion of qualitative data was implemented. The qualitative data was quantified by calculating the frequency of transcription codes (Tashakkori & Teddlie, 1998), thereby allowing for the identification, prioritization, and interpretation of themes within the study data

(Onwuegbuzie & Leech, 2004). Once themes were developed from the qualitative interview transcripts, high frequency codes were used to determine the priority of the themes and sub-themes in the qualitative data. The researcher compared the dominant themes of the qualitative transcripts with the resultant frequency calculations, thereby further analyzing the phenomenon being studied (Onwuegbuzie & Leech, 2004).

Findings

Qualitative and quantitative data were analyzed independently prior to merging the results together. Qualitative data from participant interviews were analyzed through an iterative process as the researcher revisited previously analyzed interviews as new patterns emerged (Anfara, Brown, & Mangione, 2002; Spiggle, 1994). As part of content analyses, all interviews were examined using codes informed by the study's theoretical framework. Additional codes were added as further emergent themes became evident during the early coding stages. Themes were developed based on both commonalties and differentiation observed from various school sites or stakeholder roles within the districts resulting in four primary themes: inquiry; learning beyond the boundaries; collaboration; and focus.

The questionnaire items were also categorized based on themes that emerged from the qualitative data. Items were clustered based on each theme. These clusters were examined using Cronbach's Alpha coefficient reliability calculators to ensure the reliability of the questionnaires (DeVellis, 1991). The interviews were also quantified to further support the prioritization of themes through the code frequency (Onwuegbuzie & Johnson, 2006). Quantitative data was also analyzed and summarized using descriptive statistics. The qualitative and quantitative data were then compared, contrasted, and analyzed (Creswell, 2008).

The four primary themes of the interviews were also quantified, based on the coding frequency in the interviews. In total, 71 codes were used to analyze the interview transcripts for

each of the four stakeholder roles (system leader, principal, teacher leader, teacher). A five-step process was utilized to quantify the qualitative data: identify high frequency codes for each stakeholder role; determine overall rankings for each code based on an amalgam of all roles; cluster and order high frequency codes into the four primary themes; and calculate the frequency of primary themes in the qualitative data. The codes were clustered based on the primary themes, resulting in the following frequency of the quantified data: inquiry (37.5%); learning beyond the boundaries (23.4%); collaboration (22.6%); and focus (16.6%).

Inquiry

The various components of inquiry were deemed important by participants in the four stakeholder roles, a vital part of knowledge creation. This included the processes of analyzing data, reflecting on instructional and leadership practices, developing next steps, and monitoring the progress of students, schools, and districts. Analyzing data was consistently referred to as an expected part of each stakeholder role, as well as the starting point for the essential action of reflecting on practices. All principals revealed that the expectation of using data was embedded in a variety of professional learning opportunities and meeting structures at the district and school levels. Various data sets were utilized by participants in this study such as the Education Quality and Accountability Office (EQAO) provincial assessments, common assessments (e.g., consistent assessments used throughout a school or district), and classroom-based teacher assessments.

All educators mentioned an expectation of data use through the process of collecting and analyzing data such as common assessments. This involved the formal procedure of submitting common assessment scores, as well as report card marks and comments. The usefulness of common assessments was pointed out by 78% of educators. Although the assessments were only implemented two or three times per year, the data were drawn upon to identify students'

strengths and needs, develop goals, and provide data for collaborative inquiry processes. Various common assessments provided educators with information such as "*core skills that [students] need to build, like summarizing and interpreting. … That's something that we place a heavy value on."* Educators also indicated that this type of *"concrete data"* offered reinforcement for the observations of students that were made in the classroom on a daily basis. Data gathered from observations and dialogue were also identified as essential to gain an in-depth understanding of student learning and informed future action. In doing so, stakeholders described having a better understanding of student needs by triangulating data; artifacts (e.g., assessments, student products), observation, and dialogue.

The process of meeting with educators to analyze data and review practices was discussed by all principals. Some meetings that included the principals were formally structured, for example, regularly scheduled special education team meetings to review the progress of students on individual education programs. Student progress was monitored and specific instructional foci were determined based on the results of EQAO provincial assessments, common assessments, and classroom-based teacher assessments (e.g., reading for meaning, including details from a text): "*It's not looking at data at the school level, [educators] are looking at data at the kid level and their classroom to change and inform their practice."*

In support of collaborative inquiry, two initiatives were highlighted in each district, Teaching-Learning Critical Pathways (TLCP) and Collaborative Inquiry for Learning-Mathematics (CILM). These initiatives were encouraged by the ministry as a formal way of investigating the effectiveness of instructional strategies used in the classroom. Educators and principals were engaged in developing units of instruction based on the needs of students, implementing instructional plans in classrooms, monitoring student progress, and evaluating instructional strategies based on student achievement. Professional learning community (PLC)

or TLCP sessions were referred to by 82% of teacher leaders as opportunities to analyze data, reflect upon instructional strategies, and determine next steps. As student products were reviewed, teams considered why students were not attaining specific skills and what instructional practices were necessary to move them forward: "*It allows you to target your students that are struggling. I've found the dialogue to be most beneficial ... it gives [educators] that opportunity in the classroom to use those specific strategies."* Furthermore, 63% of teacher leaders specifically discussed the inquiry that occurred within the TLCP as a way to challenge their own practices and ways of thinking: "*I think that's one of the ways that we're trying to look at the data and say – OK, are we effectively doing our job? Or, do we need to keep going back and focusing on the pathway more?"*

All system leaders pointed out that the use of data at the school level was an expectation of the districts. However, it was also noted that in some cases it was "*un-mined data ... but we're getting better at looking more deeply into what that gives us and then working with it in a targeted way."* A majority of system leaders (80%) also commented on specific instances of reflecting on various district level practices. This involved system leaders reviewing student achievement data to determine resource allocation and assess the effectiveness of system practices and processes such as special education models and summer programs for students. *"We use the data for instance to assign additional resources to the school. ... We sit down with the data and talk about the needs and allocate staff accordingly."*

All principals commented on their district's support to develop assessment literacy skills, that is, using data to make informed decisions. Whether monthly principal meetings or network meetings, time was devoted to collectively guide principals through the process of analyzing data, especially in analyzing EQAO provincial assessment data. In describing the use of EQAO data, 82% of principals connected to the relevance of the student's Item Information Reports

(IIR): *"We could actually look at individual kids ... now I can look at that child as opposed to a global number."* The IIR allowed principals and educators to view the results of each student, question by question. The individual results were then compared to school, district, and provincial results. Moreover, 82% of principals noted that their assessment literacy skills also improved when working with educators in teams to analyze data, reflect on current practices, and consider next steps. Educators consistently highlighted a hands-on approach to becoming more comfortable with analyzing data and determining next steps. *"We look together at the data and analyze it and see together what our next steps are." "[The principal] provides us with those data so we have a chance to break it down as staff."* Teacher leaders (82%) noted the regular opportunities to further develop their assessment literacy skills due to their leadership role. All system leaders referred to a hands-on approach to gaining assessment literacy skills while analyzing school and system achievement results. "*As a team, we just get so good over time at working with each other and really pulling everything apart and analyzing data ... data tells the story about where we need to go."* Only 40% of systems leaders identified external supports for their own development of assessment literacy skills. "*I think it's actually one of our greater weaknesses quite interestingly enough."* When external training for system leaders was mentioned, professional learning opportunities from the ministry or EQAO were noted as well as training aligned with the districts' data management systems.

Learning Beyond the Boundaries

At all levels, classroom, school, and system, participants identified the process of connecting with others beyond the boundaries of their regular working environment (e.g., classroom, school). For example, 82% of principals and teacher leaders took part in professional learning opportunities beyond the school as part of their roles. In discussing these connections outside their schools, principals and teacher leaders emphasized their role in bringing back

knowledge to the schools to share. Reid (2014) has defined *knowledge influencers* as "leaders, formal or informal, who have access to knowledge creating groups at the local and system level. These leaders influence knowledge mobilization at different levels of the district" (in abstract). School level knowledge influencers such as principals and teacher leaders were essential sponsors in mobilizing knowledge between groups. They played a key role in sharing and creating knowledge between individuals, groups, communities, and levels of the district. Teacher leaders were able to participate in and share among the teams at the school and system levels. In turn, they participated in creating knowledge with teams and also mobilizing knowledge between teams. Many principals (63%) explicitly referred to the importance of teacher leaders in advancing effective instructional practices and supporting reflective dialogue through team meetings: *"[the teacher leaders] are asking similar questions that I'm asking. ... They're asking themselves in their planning – How can we differentiate this task? How can we improve [students'] ability to think more critically?"*

Accessing system and ministry initiatives to support collaborative inquiry was viewed as valuable. System and ministry *experts* provided new ideas and perspectives to consider and at times, facilitated opportunities for professional learning. Various system leaders were identified by principals as engaging with schools for scheduled knowledge building activities (e.g., data analysis) or available for occasional visits. This included system teacher leaders (e.g., consultants) who were associated with schools. The system leaders worked with individual educators or teams based on a recognized need. Additional external support provided through ministry initiatives was also noted by 73% of principals as this provided opportunities to investigate new knowledge and also provided "funds for release time for teacher collaboration." Many educators (62%) highlighted various system leaders who were available to work with educators or teams. *"If there's something that you're struggling on in your classroom, [system*

leaders] research it. You can have release time to plan with them, and then they'll come in and co-teach with you."

Collaboration

Attempting to promote environments of collaboration was identified as a priority area in schools and districts. At the school level, educators were supplied with occasions to come together during the school day to collaborate whenever possible. Collaboration was viewed by principals as an opportunity to promote student and educator learning. All principals stated the importance of scheduling collaborative work opportunities into the timetable. Dependent on the size of the school, common preparation time was provided to grade teams, divisional teams, adjacent grades, or whenever possible. Being as creative as possible to support this collaborative work was noted by 82% of principals. For example, this involved occasionally budgeting for special projects, banking supply coverage days, or participating in projects that specifically provided occasional classroom coverage. All educators commented on the provision of common preparation time when describing how structures within the school workday supported their collaborative work currently or in the past. The goal of providing this time for grade team planning through common preparation was discussed, however, most of the schools in this study were not large enough to facilitate this type of schedule for all educators. Furthermore, although collaborative work could not be mandated during an educator's preparation time, it was noted by 68% of educators that this was encouraged by the principal: "*There's a very clear expectation on how we need to be working on teams. And that is really what differentiates us from a lot of other schools."*

All principals provided time for the dissemination of information during various meeting structures such as staff meetings, grade team meetings, and leadership team meetings. This collective sharing was meant to promote further collaboration among staff. For example,

encouraging and providing time for dialogue during staff meetings was viewed as important as it allowed teachers to collaboratively share their knowledge. It was commented that during staff meetings and grade team meetings, collaboration and sharing was intentionally planned: *"[Educators] are deliberately put in teams a lot. We're sort of forcing the relationship to some degree, by some of the activities that we plan for them."* The dissemination of information was noted by all educators as an essential process within structured team meetings. As part of their collaborative work, 61% of educators described an expectation for distributing information to the grade team, division, or entire staff. For example, staff meetings often encompassed a professional learning component that allowed for sharing of resources that were piloted in classrooms, strategies that were successful with particular students, or professional reading materials. All system leaders also discussed sharing information with educators and principals at system meetings. This information was expected to be brought back to the schools for dissemination.

The importance of trust and risk-taking were mentioned as prerequisites for collaborative engagement. Principals were identified as a vital factor in developing norms that encouraged positive and constructive cultures in attempts to promote innovation. To foster collaborative environments in which staff were open to learning from and with one another, all principals discussed promoting cultures of trust and risk-taking. Principals promoted risk-taking and innovation during various meeting structures and collaborative work environments. For example, principals encouraged educators to take the risk of sharing the practices in the classroom that they found to be supportive during various meetings: *"We're putting [educators] in front of their colleagues. … We're trying to do that more and more with our teachers."* Educators were also encouraged to visit other schools to capture new and innovative ideas strategies for working with students.

In order to realize environments that educators felt comfortable to take risks, 84% of educators highlighted the vital impact of principals: *"It depends on the administrator. I mean certain principals I feel more comfortable voicing my opinion to."* Moreover, 59% of educators specifically commented on actions that the principal took to support a trusting environment. For example, this involved the principal taking part in learning opportunities, as well as setting and modelling norms for regularly scheduled collaborative work sessions. At times, educators discussed how principals were the first to question new initiatives introduced. As part of the norms, educators were encouraged to openly state their opinions and challenge perspectives without passing judgement on others.

Focus

All stakeholder roles emphasized the importance of focus, that is, the concerted efforts of staff in specific areas of attention. The focus on student and educator learning was frequently expressed. Founded on student achievement results and the professional learning needs of educators, principals and educators determined current and future next steps that required targeted attention. However, a majority of principals (82%) discussed the difficulty of several initiatives competing to become a focus of professional learning. Prioritizing the energies of staff was revealed as an effective implementation strategy. For example, a principal asked staff to brainstorm the number of initiatives that came into the school over the past five years. After listing 57 initiatives in total, staff were asked to rate them based on 'level of importance to the educator'. The top five initiatives then became the priorities for the "year of consolidation." This was viewed by principals as an example of delving deeply and focusing in on a few initiatives and "*choosing to fail*" in other areas.

Most educators (78%) pointed out that prioritizing current and future actions were determined through various school-based processes such as developing school improvement

plans or developing long-range classroom plans. Identifying next steps through collaborative inquiry processes such as the TLCP was another process discussed. As noted by 51% of educators, these school-based processes included setting goals to support specific priorities within the school. The goals fuelled the focus for the year and priorities for various team meetings. For example, the school improvement planning process supported the development of a collective focus: *"our goal is to move all of our students up. We always take a main focus so we're all on the same page."*

System leaders and principals aligned the priorities, goals, and actions of staff with the fundamental mission of the organizations: the success of all students. Leaders also made efforts to align the priorities of the ministry, districts, and schools. The ministry was referenced by all system leaders when discussing the prioritization of current and future actions. This involved making connections between the ministry's core priorities and the actions of the district. Based on annual and long-term ministry initiatives, system leaders prioritized and aligned their action plans, professional learning opportunities, and dialogue with system and school staff. All system leaders highlighted the positive support provided by various ministry initiatives and engaged in focusing on the initiatives with principals early in the school year.

Discussion

For knowledge to be created and mobilized throughout an organization, opportunities must be provided to allow teams to: develop a shared context; exchange *tacit* and *explicit* knowledge; and engage in dialogue that involves constructive conflict. Nonaka and Takeuchi (1995) explained tacit knowledge as internal knowledge that is developed through experience and is difficult to describe. Conversely, explicit knowledge is externalized knowledge that is easily transmitted from one person to another. As individuals exchange tacit and explicit knowledge through collaborative efforts and inquiry, new knowledge amplifies through an

organization, that is, it spreads from individuals to teams, divisions, schools, districts, and beyond. When the learning extends beyond the individual to become part of the practices of the organization, it is then considered organizational learning (Hedberg, 1981; Fiol & Lyles, 1985; Robinson, 1995).

Reid (2014) found that principals and teacher-leaders played key roles in facilitating knowledge creation within teams as school-based knowledge influencers. They ensured that new knowledge was mobilized by sharing new understandings and perspectives with individuals and teams at various levels of the districts. Otherwise, the new knowledge remained static with an individual or team, not amplifying throughout the system. It was also found that knowledge influencers were engaged with experts at the system level, charged with the task of bringing new knowledge back to the school level. In time, knowledge influencers developed their capacities as experts in areas including instruction, learning, assessment, and leadership. Knowledge influencers also modeled the difficult task of critiquing instructional practices during team meetings. This involved openly challenging common perspectives and practices upheld in schools and districts.

As described previously, four themes surfaced from the analysis of the qualitative and quantitative data: inquiry; learning beyond the boundaries; collaboration; and focus. These findings were further analyzed based on the theoretical framework of this study. The resultant significant findings are highlighted under the following themes: the importance of data; priorities, alignment, and tension within systems; and time factors.

The Importance of Data

The underpinnings of knowledge creation involved the use of data. Its use was required at all levels of the districts. A range of artifacts (e.g., student achievement data sets, student products) was used during collaborative inquiry and various team meetings. Although this type

of data was valued, all stakeholder roles also identified using observations and dialogues as valuable types of data. This combination of quantitative and qualitative data was used to deeply analyze progress, strengths, needs, and intuitions. The concept of dialogue was also valued by teachers as a way of connecting with students in an attempt to help students become self-assessors of their own progress and next steps. To further develop the assessment literacy skills of principals and educators, system leaders modeled the use of data to make informed decisions. System leaders frequently sat side-by-side with principals to analyze school-based data to inform school improvement processes. The requirement of experts to support the development of assessment literacy was emphasized. The use of data required not only data analysis skills, but also a deep pedagogical knowledge base to inform the decision-making process. Specific students were also tracked over time, i.e., marker students. These students were frequently brought to teams to exchange ideas and make collective decisions concerning next steps for support. The importance of using data to make evidence based discussions is described in the following sub-sections: range of data sets; assessment literacy; and marker students.

Range of Data Sets

Bernhardt (2009), Shen and Cooley (2008), and Earl and Katz (2006) highlighted the importance of working with various data categories when inquiring about the progress of students. In this current study, student learning data sets frequently included EQAO provincial assessments, common assessments, and classroom based assessments. Although EQAO was frequently noted by all stakeholder roles in this study, it was emphasized that a variety of assessment data were analyzed as one data set would present inadequate information to direct future actions. In an attempt to determine the specific needs of students, a variety of data sets were analyzed by all stakeholder groups. Student achievement data were a primary foundation for discussions about instructional practices and processes within classrooms and schools. Based

on the individual contexts of their classrooms, educator teams reflected on the needs of students and implemented instructional next steps. As decisions of action were collectively reflected upon, data were transformed into knowledge (Ackoff, 1989; Breiter & Light, 2006; Druker, 1989). Boudett, City, and Murnane (2006) suggested the importance of analyzing a variety of student achievement data while considering the limitations of each data set. In this current study, EQAO and common assessments were noted as important components of assessing students based on a common set of measures associated with the curriculum. Although these data sets supported the identification of student needs and instructional priorities, EQAO occurred once a year (grades 3 and 6) and common assessments only took place two or three times a year, a notable limitation for both data sets. Therefore, it is critical that educators have other data sets to monitor student progress frequently, allowing for an in-depth understanding of students, reflection on the part of the practitioner, and strategic instructional responses.

Assessment Literacy

In most high performing districts, researchers have found that assessment literacy skills are recognized as essential for school staff and opportunities are provided for educators to develop these skills (Elmore & Burney, 1998; Maguire, 2003; Scheurich, Skrla, & Johnson, 2000). Anderson, Leithwood, and Strauss (2010) suggested that system leaders positively influence the use of data at the school level by "modeling data-informed decision making" (p. 310). In this current study, principals were openly positive about the support specific system personnel supplied in understanding and using data to make informed decisions. Most often, this was recognized as an important resource to gain guidance from, or collaborate with, an expert while analyzing data and considering future actions. This side-by-side modeling approach to developing assessment literacy skills was reported as evident in their districts by all stakeholder roles within this current study. Educators highlighted the importance of collaboratively working

together to develop the skills of analyzing data and student products in order to establish instructional next steps. Principals and teacher leaders were frequently identified as providing guidance to their teachers to further understand data and its implications for instruction. To support educators and principals in making decisions informed by data, researchers have stated that professional development in analyzing data is required, as well as the provision of time for analysis of data (Breiter & Light, 2006; Ikemoto & Marsh, 2007; Louis et al., 2010; Means, Padilla, DeBarger, & Bakia, 2009). As emphasized in Scott, Webber, Aitken, and Lupart's (2011) research, the relationships between assessment and instruction are complex. To utilize data effectively, teachers must also have a deep pedagogical knowledge to make informed decisions concerning next steps for instruction (Parr & Timperley, 2008). Furthermore, due to the complexities of interpreting data, many researchers expressed the need for educators and principals to acquire guidance from experts (Herman & Gribbons, 2001; Schildkamp & Kuiper, 2010; Van Barneveld, 2008). Interestingly, in this current study, some system leaders remarked that their own professional learning opportunities in the area of assessment literacy were lacking. This finding represents potential problems for districts in moving forward with inquiry founded on data, as principals in this study identified a primary reliance on system leaders in developing their own assessment literacy skills. Hence, it is incumbent on systems to ensure their leaders have a comprehensive and deep assessment literacy knowledge and expertise in order to facilitate continuous enhancement of optimal instructional practices informed by evidence.

Marker Students

Each district required *marker students*, that is, students close to attaining the provincial achievement standard (i.e., level 3, 70-79%), be identified and tracked over time. Educators and principals were expected to monitor the achievement data of marker students as specific initiatives or various strategies were implemented to support their progress. However, focusing

efforts on students close to a standard has been described as a potential deficiency when there are other students with higher needs, those farther from the standard (Hamilton et al., 2009; Linn, 2006). In this current study, all groups of stakeholders expected that the knowledge gained through this inquiry would benefit the marker students as well as the remainder of the class. During collaborative inquiry sessions, staff meetings, and network meetings, student products and recent progress of the marker students were focused upon. Oláh, Lawrence, and Riggan (2010) indicated that when "teachers targeted the lower performing students … high-scoring student received less direct instruction" (p. 240). However, it was expressed in this current study that the needs and progress of all students were consistently monitored, not only those of the marker students. Furthermore, it was noted that students responded differently to a variety of strategies and resources. Some instructional practices even hindered the progress of high performing students and were therefore discontinued for those students. By focusing on marker students for longer periods of time, educator teams were spared the tension of rushing to implement immediate short-term solutions without taking time to truly understand the students. Without this understanding, these teams can find themselves involved in an *activity trap*, that is, a well-intentioned but unnecessary activity that will therefore not produce the desired results (Katz et al., 2009).

Priorities, Alignment, and Tension within Systems

System priorities provided opportunities for schools to work toward common goals. The alignment of system priorities allowed for potential augmentation of efforts at all levels of the districts. However, when the priorities and goals became too specific, a misalignment between levels was possible. Promoting priorities and alignment within classrooms, schools, and districts is discussed within the following areas: system priorities and promoting alignment.

System Priorities

Wohlstetter, Datnow, and Park (2007) stressed the importance of system leaders having an understanding of school level "needs, strengths, and weaknesses and development capacity plans" (p. 255). Otherwise, goal conflict may result between schools and districts, placing pressure on principals to disengage from external initiatives. Louis, Leithwood, Wahlstrom, and Anderson (2010) stated the importance for principals to have adequate flexibility while engaging with district directions. Similarly in this current study, participants from all levels of the district agreed with Louis and her colleagues' contention and reported that when ministry, district, or network priorities became too specific, a resultant misalignment and tension became evident. For example, when teachers from the current study felt that strategies became too narrow to meet the specific needs of their students, the validation for teachers to participate in learning opportunities was compromised. Teachers indicated a desire to engage in learning that met their professional needs while targeting the specific needs of their students. Merriam (2001) indicated that this validation was an important part of supporting self-directed learning, a pillar of adult learning theory. Participants from all stakeholder roles in this current study positively noted that increased levels of flexibility within priority areas were being provided by principals, systems leaders, and the ministry.

At the system level, Marzano and Waters (2009) and Honig and Hatch (2004) highlighted the importance of district leaders monitoring school goals and actions in order to inform district processes. This is a complex and ongoing function as needs and contexts at the school level are ever-changing. System leaders in this current study modeled this process by differentiating levels of supports predicated on improvement plans, student achievement, and the specific needs of principals. Tensions between district, school, and classroom directions must be modulated with a continued advancement of knowledge creating teams. Principals and educators require

the flexibility to target the contextual needs within schools and classrooms while engaging in and aligning with system priorities.

Promoting Alignment

Principals in this study made a concerted effort to focus only on a few priorities, goals, and actions due to the multitude of initiatives available from districts and the ministry. By aligning the priorities of schools, districts, and ministry, principals felt that resources, training, and funding could be best augmented. As different levels of the district were focused on similar priorities, newly created knowledge transferred between levels of the organization (Nonaka & Takeuchi, 1995). Principals in this current study openly discussed the alignment of priorities with educators while determining school goals through school improvement and long-range planning. To align with the schools' goals, principals attempted to bridge various initiatives and priorities; that is, connect and highlight common practices, themes, and strategies within seemingly diverse resources. Conversely, initiatives and priorities that did not align with the goals of the schools would not necessarily become a priority in the school or be mandated by the principal. This form of taking actions to buffer educators from external pressures has been identified as a leadership tactic (Crow & Weindling, 2010; DiPaola & Tschannen-Moran, 2005; McLaughlin & Talbert, 2001). In an attempt to buffer staff, principals negotiated interactions between school and external communities "to protect teachers from undue community pressure" (Crow & Weindling, 2010, p. 141). Nonetheless, principals in this current study emphasized that competing external pressures made this difficult which reinforced Volante, Cherubini, and Drake's (2008) findings that principals felt overloaded by initiatives from the ministry. This concept of middle management playing the role of facilitating interactions between levels of the organization is explored in knowledge creation theory: "…middle managers synthesized the tacit knowledge of both frontline employees and top management" (Nonaka, 1994, p. 32). In this

current study, principals were consistently called upon to make sense of new knowledge gained at the system, school, and classroom levels. This was exemplified in their efforts to align priorities from the ministry through to the classroom while taking into account the context of the schools.

Time Factors

Time is always a contentious issue in schools and this study was no different. Ermeling (2010) and Gallimore, Ermeling, Saunders, and Goldenberg (2009) strongly argued the critical importance of providing time for the pursuit of teacher collaboration. In this current study, the provision of time was clearly a factor at the school and system levels when attempting to engage staff in examining data, instructional strategies, and next steps of action. Principals scheduled common preparation and release times whenever possible based on their conviction that collaboration led to deeper understandings of instruction and improved student achievement. To allow for additional collaborative work sessions, many principals identified that they personally provided coverage when possible for teachers' release.

After researching professional learning in districts and schools, Ingvarson, Meiers, and Beavis (2005) indicated that as professional learning opportunities at the school level are planned, key components must be considered such as "time to think, analyse and talk about the specifics of what was going on in classrooms and what students are doing and learning" (p. 17). System leaders and principals in this current study demonstrated a commitment and desire to provide time for these key components as discussed by Ingvarson and colleagues. Collaboration was identified by principals in this current study as an essential condition necessary to support a consistent focus on student and educator learning. However, Hadfield's (2005) study found that regular blocks of time in and of itself to meet was often spent completing administrative tasks and learning was not likely to occur. Similar to the findings of this current study, in order to

promote sharing and the creation of new knowledge, leaders found it incumbent on them to support processes within the meetings that focused on learning and not administrative tasks. Educators also highlighted how their principals utilized collaborative time together to promote learning environments of trust and risk-taking. This involved the participation of principals, openly taking risks to learn with teachers and setting norms for effectively utilizing collaborative time together. For example, collaborative efforts were based on the reflection of past, current, and future actions, without passing judgment on others. Principals also monitored collaborative time by connecting with educators prior to, during, and/or after meetings to review the progress toward the teams' learning goals. It is important for leaders to keep in mind that the provision of time, although necessary, is not a panacea for knowledge creation. Leaders must ensure that learning processes are also embedded within collaborative structures.

Research continues to support the conception that communities of learning contribute to enhanced instructional practices (Little, 2003; Stein et al., 1999) and also improved student achievement (Bryk & Schneider, 2002; Louis et al., 2010; McLaughlin & Talbert, 2001). However, research is still necessary in understanding the connections between the collaborative work of teachers, enhanced instructional practices, and improved student achievement (Gersten, Dimino, Jayanthi, Kim, & Santoro, 2010). In this current study, ministry and district funding were used for the purpose of providing collaborative time at the school and system levels. The provision of additional funds to support change initiatives and professional learning in educational systems is commonplace (Phillips, 2003). Unfortunately, Bulkley, Christman, Goertz, and Lawrence (2010) found that the foundational components of initiatives were at risk as supports, such as time for collaboration, were withdrawn. It is not surprising that in this current study, system leaders and principals emphasized the reliance of time to delve deeply into the fundamental underpinnings of any initiative in order to refine and advance practices.

Although time was provided for pilot projects, it was frequently absent when expanding throughout schools and districts. This was due to financial constraints as well as capacity restrictions of human resources at the system level to support the extension of projects system-wide.

Resnick and Spillane (2006) acknowledged that organizations often require structural redesign to encourage organizational learning and sharing opportunities. Consequently, to support communities of knowledge creation, district and school leaders must design structures that provide time for groups to collectively learn together. Without time, the amplification of knowledge moving from individuals throughout the system is not viable. In this current study, educators appreciated the time provided to be active participants in professional learning with their peers, opportunities that were relevant to the context of their classrooms. Collaborative inquiry was facilitated through communities of learning at the school and system levels. System leaders stressed the value of providing time and support to educators and principals in developing their instructional and leadership abilities. Even so, principals and educators noted that the presentation of vast amounts of information at some system meetings dominated the time allocation over that of time for discussion about instruction and learning in classrooms. Therefore, if the creation and mobilization of knowledge throughout systems is the desired goal, then district and school leaders must resist the pressure of predominantly using valuable time for the dissemination of immense quantities of information.

Conclusion

This study involved the examination of how leaders influence knowledge creation and mobilization processes. For the purpose of exploring effective practices and processes in support of knowledge creation and mobilization, this study analyzed the individual and collective reflection on data and practice, as well as current perceptions and understandings. Important

components of knowledge creation and mobilization involve learning as a social activity and challenging individual and collective assumptions. As knowledge-creating groups collectively engaged together to challenge current knowledge and preconceptions, new knowledge was created and implemented in classrooms, schools, and districts. In this study, the multiple perspectives focused on the leaders' role in knowledge creation and mobilization lowered the risk associated with self-report and researcher bias. In reviewing the data gathered from different levels of the organization and through different forms (e.g., individual and focus group interviews, document review), multiple sources of confirmation were available when drawing conclusions.

The process of creating knowledge involved analyzing data and challenging current perspectives and practices, i.e., the status quo. Each district engaged in processes to bring together principals and teacher leaders (i.e., knowledge influencers) at the system level for the purpose of knowledge sharing, professional learning, and collaborative inquiry. These types of collaborative system processes were positively perceived by principals and teacher leaders as reported in this study. However, these knowledge influencers also noted that this precious time could, on occasion, be consumed by the dissemination of vast amounts of information, hence was identified as an ineffective way to learn and promote change.

It was evident that participants from each stakeholder role in this study valued the function of leaders in promoting environments and cultures of reflection and sharing in which knowledge was collaboratively created and mobilized throughout the organization. Principals were essential to the inquiry processes outlined in this study. They supported and modelled the difficult task of challenging the status quo and advancing different ways of thinking and acting. This involved difficult conversations in which productive conflict was encouraged as an opportunity to promote creativity and innovation. For this to come to fruition, it was necessary

for the principal to foster safe environments in which taking risks did not involve the fear of reprimands. Principals celebrated those who took risks and did not take offence when they were respectfully challenged. Through this collaborative inquiry, student learning was monitored and instructional practices were challenged. Moreover, educators took an introspective look at their own learning needs and challenged their understandings.

Focusing on a few priorities, goals, and actions was identified by system leaders and principals as a way to either align efforts or buffer staff from a deluge of external opportunities that could detract and dilute collective efforts across the system. The potential tension of being overloaded by the numerous initiatives available to districts and schools was expressed by all stakeholder roles as a challenge. To maximize the potential benefits of learning across the districts, it was evident that there was a concerted effort made at the system and school levels to align the priorities between the ministry, districts, and schools.

Based on the findings of this study, the creation and mobilization of knowledge involves processes of ensuring that leaders and educators are provided with time to analyze data and move forward with the difficult task of reflecting on instructional and leadership practices. When educational institutions are attempting to promote the evidence-based decision making, data is a foundational requirement. As leaders support collaborative processes that involve the creation and mobilization of knowledge, it is posited by this researcher that a synergy can be achieved through an effective knowledge creation and mobilization strategy. Staff from all levels of the systems would participate in collaborative knowledge creation by challenging current knowledge and preconceptions, mobilizing knowledge within and beyond levels of the organizations.

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