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DESIGNING AUTHENTIC INQUIRY TASKS FOR 21ST CENTURY LEARNING

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INTRODUCTION

I am not the teacher I used to be.

Today I know more about good teaching; I am no longer the only teacher in the room.

Today I know more about what it means to know and to understand; I am no longer the expert.

Today I know more about what it means to learn; I am a learner myself. Indeed I am not the teacher I used to be, and I am proud of it!

I am no longer this teacher because over the course of my career, my beliefs about teaching and learning have changed. Although I can't single out any one event, I would attribute these changes to a wealth of experiences, opportunities and people, all of which have served as catalysts in shaping (and reshaping) my thinking.

First, as a teacher I encountered diverse settings while teaching Kindergarten through Grade 8 in both French Immersion and urban community schools. As a teacher-librarian, I experienced opportunities to foster my skills while collaborating on curriculum, instruction and information literacy. As a graduate student, I learned how it feels to blog online while completing assignments for a global community. Finally, I learned about educational change, leadership and best practices in literacy through my work as a school-based and division-wide literacy teacher and professional developer.

Above all, there have been people who have shaped my thinking: students who expected me to help them learn and to engage them more fully; teachers who welcomed me into their classrooms and conversations; and colleagues who supported me and perhaps more importantly, questioned me. There were also those whom I never met but influenced me greatly through their words: Jeff Wilhelm, John Barell, John Dewey, Ross J. Todd, Grant Wiggins and Jay McTighe

to name but a few. Without all these people, opportunities and experiences, it's hard to predict the teacher I would be today.

Now, nearly twenty years into my career, I feel that I have been offered a second career. This new career began when I started thinking about curriculum and knowledge in new ways. It began when I was no longer afraid to admit that in today's information-rich landscape, I was not adequately preparing my students for the 21st century workplace simply by asking them to practice skills they already knew or to rearrange someone else's knowledge into neater piles. Indeed, this new and complex information environment requires students to be lifelong learners, skilful critical thinkers, problem solvers, and literate in multiple ways far beyond those I had experienced in my own childhood.

Amid this increased emphasis on teaching 21st century skills a vast amount of literature has been published identifying and describing these skills. However, an important but neglected piece of the puzzle is exploring why these skills are necessary, and how these skills might be put into action in the classroom. For this reason, I have chosen to write my capping paper on the topic of designing learning experiences to foster skills for 21st century learners. To illustrate what I envision, I have composed the following scenario. Although fictitious, this conversation is representative of many conversations that I have had:

A group of teachers gather around a table for a professional inquiry afternoon to collaborate on an upcoming unit for their Grade 4 classroom. Their goal: rethinking their traditional Saskatchewan heritage research project. The teachers know they want something different for their students than they have done in the past, but they aren't sure what it is or how to go about planning it once they know. For this reason, they have invited Tracy, their teacher-

librarian into their planning afternoon. Tracy has knowledge and experience with the inquiry process and the teachers hope that she will assist them with their thinking.

The teachers have come prepared with curriculum knowledge, past projects and most importantly, a willingness to explore new ways of teaching and learning. The collaboration begins as one teacher, Lori, highlights a past research assignment on Saskatchewan. It is a beautifully crafted scrapbook, nicely typed and carefully organized into topics: location, food, places to visit, etc. Photographs and maps are precisely placed and meticulously labelled to bring additional meaning into the text.

Tracy recognized this as the traditional research project that many Grade 4 students have completed. In fact, in Tracy's first year of teaching, she had taught Grade 4 and had her students complete a very similar project. Yet Tracy knew that the teachers had invited her into their conversation to help them redesign and rethink their project. Could she help them tweak their project?

Tracy began, "This is a beautiful project." It was. "However," Tracy continued, "let's begin by asking what we really want our students to learn? What is it about heritage that is most important for our students to really understand? When all the facts about Saskatchewan have faded from a student's memory, what is the 'take-home message' we want this student to leave with?"

It was quiet as the teachers thought. After a moment, Sarah spoke up, "Well, that our past is important, I guess."

"Why?" Tracy prompted further.

"Well, because our past has shaped who we are today."

"Absolutely," stated Tracy. "You see, that's the big idea about studying heritage."

Terry, who had designated herself the meeting recorder, quickly wrote the following:

Big Idea: Our past has shaped our life today.

“Now, let’s frame that big idea into a question to guide our thinking. What question would guide our students toward that big idea?” Tracy prompted again. After a few moments of thought, Diane responded. “Maybe something like how has our past shaped our life today?” Terry quickly wrote that down.

Guiding question: How has our past shaped our life today?

With big ideas and a guiding question falling into place, it was beginning to feel like inquiry. There were just a few more details needed. “What would our students need to know in order to answer that question?” Tracy once again pressed.

With energy flowing and momentum high, the team brainstormed a list of other possible questions: “What are the events, people, and places that have shaped our past? How have these events changed our life? How do we know about these events? Why are these events important to remember?” The teachers looked back into their curriculum documents and continued the thinking while connecting their questions to the objectives stated in the Grade 4 social studies curriculum. Soon the foundation for the project was underway. Yet there was still one giant hurdle to jump. How were the teachers going to help the students uncover these questions? Then how would the students show the teachers that they had indeed uncovered them?

Fortunately, Tracy had been inspired the previous summer by the book, *Why are School Buses Always Yellow?* by John Barell. Still fresh in her memory, Tracy thought back to this book and Barell’s suggestion of putting real-life scenarios into inquiry projects and recalled an example from his book that highlighted a similar project on heroes.

“Who are real people who work on these questions?” Tracy furthered. Museum curators, they all agreed after some thought and discussion. Using Barell’s suggested framework, the team generated the following problematic scenario:

You have been hired as the new curator of the Museum of Saskatchewan. Your first task is to design an exhibit that represents the most important person, place or event that has shaped your life today.

Finally, to ground the project in assessment for learning principles that focus on using exemplars, the team realized that there were plenty of real-life exemplars right in their community: museum exhibits. Soon, a list of museums to visit and curators to contact was created, along with a plan to co-construct criteria with the students to ensure that the students understood “What counts in a quality museum display?” The collaborative journey toward a deeper understanding of heritage, quality teaching and assessment, and even a new friendship was underway.

As the project progressed, the teachers noticed evidence of continued student engagement. Despite the open-endedness of the task, they rarely had to ask students to focus or stay motivated. The collaborative efforts of the entire team allowed for opportunities to scaffold and intervene in timely ways to keep students engaged and to individualize learning.

Most importantly, the teachers were proud of the deep understanding displayed by all the students. As the Museum of Saskatchewan came to fruition, students truly became curators of their exhibits; they knew exactly what the job entailed in the real world and as a result, they planned and designed their exhibit carefully, spoke expertly and answered questions thoughtfully. The feedback from “museum visitors” to the museum truly reflected this. As well,

the feedback from the students included statements such as “I learned what it was like to be a curator.”

But the learning didn’t stop with the students. The teachers learned about the importance of history, too. Sarah told the team about one night when she awoke in panic.

“We have to go see Great Grandma this weekend,” she cried in alarm to her still sleeping husband. “Do you realize that when Great Grandma passes on, we will lose all those important memories and stories? Our family history will be lost!” Her husband gently assured her that they would visit Great Grandma very soon, and encouraged her to go back to sleep.

This scenario represents the kinds of learning experiences that I believe should become reality for all our students, and their teachers. This is the depth of learning and understanding I wanted from my own students, I just never knew it when I first began my career. Although I suspect that my students all turned out okay, I have come to see that learning has the power to go beyond the curriculum and extend into the lives, perhaps even dreams, of the learners. I have come to understand how powerful learning can be when situated within the discipline of those who undertake the knowledge in the real world, and when we allow our students to solve real world dilemmas beyond the classroom. Most of all, I believe that exploring authentic, inquiry-oriented problems can become part of every classroom task design.

This paper will explore what it means to understand, why understanding matters, and why educators must engage 21st century students in authentic, inquiry-based tasks that promote real world understanding. Staying true to my philosophy of learning, the big ideas or “take-home messages” that will be addressed are:

- Knowledge and understanding are not the same.
- Understanding is critical to success for 21st century learners.

- Twenty-first century skills are important, but carefully designed tasks are critical to facilitate understanding.

- Every child can understand and every teacher can teach for understanding, if given adequate support.

Guided by these big ideas, the purpose of the literature review will be to examine scholarly and professional literature addressing the following questions:

- What is “understanding”?
- Why are authentic, inquiry-based learning tasks critical to facilitate understanding in today’s 21st century classrooms?
- What are common elements of experiences that lead to understanding?
- What support can teacher-librarians and other instructional leaders offer to facilitate student inquiry through real-world authentic learning experiences?

LITERATURE REVIEW

What is “understanding”?

This capping paper is concerned with the expectation that authentic inquiry-based tasks facilitate deep understanding of content, an essential outcome for 21st century learners. However, what does it really mean to understand? How is understanding different from knowledge? Furthermore, why is understanding important for today’s learners? After all, hasn’t the goal of education always been to teach for understanding? This first section of the literature review aims to examine professional and research literature to answer these foundational questions.

How is “knowledge” different from “understanding”?

Often used interchangeably, “knowledge” and “understanding” may appear on the surface to be equal goals of education. However, there is general agreement in the literature and among educators that knowledge and understanding are, in fact, two distinct outcomes (Koechlin & Zwann, 2007; Kuhthau, 2010; Olson, 2008; Stripling, 2007; Wiggins & McTighe, 2005). Yet in their work with educators, Wiggins and McTighe (2005) found that when asked to distinguish between the two outcomes, educators were often left “puzzled” (p. 35). These experiences aptly convinced the authors that despite claiming to pursue the goal of student understanding, this goal itself may be poorly understood by educators. Accordingly, the authors concluded “that ‘to understand’ and ‘to teach for understanding’ are ambiguous and slippery terms” (Wiggins & McTighe, p. 35).

This ambiguity is not new. Clarifying the ambiguity of understanding has been a longstanding pursuit of scholars. Over fifty years ago, when Bloom (1956) and his colleagues proposed the Bloom’s Taxonomy, one identified outcome was to develop, in sort, a hierarchy of understanding, enabling teachers to better articulate “what does a student do who ‘really understands’ which he does not do when he does not understand?” (as cited in Wiggins & McTighe, 2005, p. 36)

However, to clearly define understanding, one must first examine what it simply means “to know.” Although there is variation in its definition across the literature, this paper will adopt a definition of knowledge as “a set of facts, skills, and procedures that must be ‘learned by heart’” (Wiggins & McTighe, 2005, p. 39). This definition is supported by numerous authors (Newton, 2003; Perkins, 1993, 2009; Stripling, 2007), many of whom have expressed concern over the focus on constructing knowledge as educational “mainstays” (Perkins, 1993). Darling-

Hammond (2008) is also among these voices, calling on education to shift its focus from the “transmission of pieces of information that, once memorized, constitute a storehouse of knowledge” (p. 2) toward a more powerful learning.

If knowledge is a memorized set of facts, skills and procedures, it brings to light the possibility that a student may commit such facts, skills and procedures into memory without understanding them. The research conducted by Gardner, Perkins and colleagues in the five-year Teaching for Understanding Project supported this “gap,” further adding that “teachers were all too aware that their students often did not understand key concepts nearly as well as they might” (Perkins & Blythe, 1994, p. 4). This common pitfall exists for “even our best students,” according to Wiggins and McTighe (2005, p. 42), who further demonstrated in their work that although evident across many content areas, this “failure” to understand is especially alarming in mathematics. Yet, Schneps and Sadler (1997) equally noted that students can “graduate from college with a science-related major and still not understand fundamental concepts [of science]” (as cited in Olson, 2008, p. 45). Likewise, teachers of reading can tell stories of “struggling readers” who might know how to read the words on the page, but struggle to make sense of what was read (Beers, 2003). An unmistakable conclusion of these findings is that teachers must overtly recognize that “knowledge alone is not understanding” (Stripling, 2007, p. 38). Rather, teaching with the goal of student understanding requires something different than the traditional mainstay focus on knowledge; beginning with a clear definition of what it really means to understand.

First of all, it is important to recognize that despite the important distinction that knowledge is not equivalent to understanding, this should not suggest an absence in the relationship between them. In effect, a relationship between knowledge and understanding is

evident and well-supported in the literature. Stated simply, “knowledge and skill are necessary elements of understanding, but not sufficient in themselves” (Wiggins & McTighe, 2005, p. 41). Similarly, Boix Mansilla and Gardner (1997) state that one understands if one is able to “use knowledge” or to “think with knowledge” (Understanding: A multidimensional task, para. 1). Indeed, this relationship between knowledge and understanding appears evident throughout the literature and is worthy of further discussion.

Many scholars in this field suggest that the relationship between knowledge and understanding is such: understanding occurs as the learner builds upon and demonstrates what they know, whether through transfer, application, interpretation, connection, or other means. For example, Wiggins and McTighe (2005) propose that understanding is constructed through a process of transfer, stating, “to have understood means that we show evidence of being able to transfer what we know” (p. 7). Koechlin and Zwann (2007) take the stance that understanding is built on what students “know,” but also “know how to do,” (p. 81) suggesting an application of knowledge. Their view is shared by Stripling (2007) who suggests that understanding happens only when the user applies knowledge and thinking skills in new ways. Likewise, Perkins and Blythe (1994) concluded that to understand means an individual can “do a variety of thought-demanding things with a topic—like explaining, finding evidence and examples, generalizing, applying, analogizing, and representing the topic in a new way” (pp. 5-6). On a similar stance, Zmuda and Harada (2008) believe understanding of key concepts results as students “take disparate pieces of data and information and identify their relationship and connection to larger ideas and themes” (p. 91). Their view implies an interpretation or connection.

Although slightly differing, these definitions all suggest that to achieve understanding, learners must go beyond knowledge. As such, Stripling (2007) places understanding at the top

rung of a continuum of learning: one that begins with facts, progresses to information and knowledge, and ultimately leads to understanding (p. 38). More importantly, these authors all propose that understanding results from “doing,” whether transferring, applying, interpreting, connecting, or other means, rather than by “knowing” alone. Consequently, Perkins (2009), after nearly twenty years of research in the field, continues to rank performance as the primary criterion for understanding (p. 49). Perkins’ performance-centered view of understanding is well-supported throughout the literature, equally shared by Boix Mansilla and Gardener, Darling-Hammond, Newton, and Stripling, to name but a few. For educators, a very practical side to this performance view of understanding is that “it directs attention to observable behaviours” (Newton, 2003, p. 18).

Common across the literature is also an overarching acceptance that understanding requires an internal construction of knowledge; a “mental construct,” according to Wiggins and McTighe (2005). Stripling (2007) expands on this, cautioning that understanding is “not inert,” but an active, mental process. According to Stripling, the active and very internal nature of understanding has implications for teachers; understanding cannot be taught, only created within the learner (p. 38). Newton (2003) agrees, while further proposing that although understanding cannot be taught, it can be supported, stating:

Understanding is not something that can be passed or transmitted from one person to another. No one can make the connection for someone else. Where there are connections to be made, the mental effort has to be supplied by the learner. Fortunately, the process can be supported. (p. 2)

In summary of this section, if understanding occurs as knowledge is personalized and internalized within the learner, constructed through a process of doing rather than knowing

alone, teaching for understanding poses difficult questions and unique challenges for educators. The seeming complexities of teaching for understanding might even spur educators to call into question whether understanding is even a necessary goal: perhaps knowing is indeed good enough.

The following portion of this literature review explores the critical role of teaching for understanding in the 21st century information landscape. After all, “the fundamental concept of using information is to find meaning and gain a deep understanding” (Kuhlthau, 2010, p. 7).

Why is “knowing” no longer sufficient?

In this rapidly changing 21st century information landscape, there is one certainty: new technologies have changed the “face” of knowledge. The February, 2011, *Jeopardy! Challenge* in which IBM’s supercomputer, Watson, outperformed *Jeopardy*’s best contestants to take the win is a clear example of this modern face of knowledge. According to Dr. Herbert Chase, a professor of clinical medicine and one of Watson’s collaborators, Watson is convincing evidence that the time for “memory-based curriculum” has long past: “The power of Watson-like tools will cause us to reconsider what it is we want students to do” (Markoff, 2011, p. 2).

In light of such technological advancements, it is widely accepted that today’s learners must go beyond knowledge as an accumulation of facts toward a new set of highly demanding skills (Kuhlthau, 2010; Stripling, 2007). Indeed, the memorization of the “overflowing storerooms” of information, given the dynamic expansion and ease of access to knowledge, may be a greatly outdated and unnecessary skill (Trilling & Fadel, 2009, p. 26). Schools must instead graduate students who are lifelong learners, critical thinkers and problem solvers, who by possessing a deep understanding of content, are able to transfer knowledge to new situations. In

the 21st century environment, “when students achieve understanding they will be more successful” (Koechlin & Zwann, 2007, p. 82).

Owning a “storeroom” of knowledge may have been a worthy goal of the past. However, “knowing a field’s core ideas, understanding its fundamental principles, and applying this knowledge to solve new problems and answer new questions are evergreen learning tasks that will never become outdated” (Trilling & Fadel, 2009, p. 26). Consequently, if understanding arrives through the act of doing, not through knowledge alone, creating these “evergreen learning tasks” is perhaps the challenge and new mainstay for 21st century education.

Inquiry-based learning: the pathway to understanding

If understanding is an essential outcome of 21st century learning, a vision of learning grounded in understanding should become the new mainstay of education. The professional and scholarly literature examined earlier in this paper put forth several important implications for educators: knowledge alone does not produce understanding; understanding results from “doing,” not from “knowing”; understanding is an active, mental construct and must be created by the user; and, although understanding is internally constructed, it can be supported and observed. These implications prompt the following questions: How do teachers enable students to go beyond simple recall toward understanding? If understanding cannot be taught, how do students develop understanding of content? What can teachers and students “do” that will support understanding? The following section of this literature review will explore professional and research literature to address these questions.

Why are authentic, inquiry-based learning tasks critical to facilitate understanding in today's 21st century classrooms?

As understanding is an active, mental construct achieved through doing, rather than knowing, the pathway to understanding is through carefully crafted learning experiences that engage students in the right kind of “doing.” Perkins and Blythe (1994) stress the importance of such learning experiences: “If understanding a topic means building up performances of understanding around that topic, then the mainstay of learning for understanding must be actual engagement in those performances” (p. 6). Perkins (2009) continues his work in this domain, further defining his vision of understanding through “inquiry;” experiences involving such skills as problem solving and problem finding, explanation and justification, argument and evidence, strategy and skill, curiosity and discovery, creativity and camaraderie (p. 30).

Although Trilling and Fadel (2009) might refer to such performances as “evergreen learning tasks,” the professional and scholarly literature generally refers to the range of these experiences using the terms “inquiry-based learning,” “project-based learning,” or “problem-based learning.” As it is generally accepted that both project- and problem-based learning are variations of inquiry-based pedagogies, this capping paper will use the terms, “inquiry,” or “inquiry-based learning.” Inquiry may be described as:

...a dynamic process of being open to wonder and puzzlement and coming to know and understand the world. As such, it is a stance that pervades all aspects of life and is essential to the way in which knowledge is created. Inquiry is based on the belief that understanding is constructed in the process of people working and conversing together as they pose and solve problems, make discoveries and rigorously test the discoveries that arise in the course of shared activity. (Galileo Educational Network Association, 2011)

Overall, the research and scholarly literature is clear about the rationale for inquiry as the pathway to understanding. This is perhaps best articulated by Stripling (2007):

Indeed, all of the processes and attitudes of understanding can be captured under the overarching stance of inquiry (the active questioning, investigation, and construction of meaning by the learner). Perhaps, then, the best way to prepare ourselves to teach for understanding is to design instruction and develop teaching methodologies that facilitate inquiry. (p. 43)

A large body of scholarly and professional literature supports Stripling's recommendation of inquiry as the framework for 21st century learning and understanding. Among those are Kuhlthau (2010) who has conducted considerable research on inquiry-based learning over the past 25 years, recently concluding: "Inquiry is a way of learning new skills and knowledge for understanding and creating in the midst of rapid technological change. Inquiry is the foundation of the information age school" (p. 2). Likewise, when the American Association of School Librarians (AASL, 2009) proposed a set of standards for 21st century learning, underpinning their standards is the belief that inquiry provides the framework for their attainment (p. 2). According to the AASL, it is through inquiry that one creates "a learner who can thrive in a complex information environment" (p. 2).

Further evidence of the powerful link between inquiry and understanding comes from a research study in 10 New Jersey school libraries where researchers Todd, Gordon and Lu found that "students went beyond merely fact finding to personal understanding" (as cited in Kuhlthau, 2010, p. 4) when carefully guided through the inquiry process. However, Kuhlthau's own research has shown that to effectively build understanding, inquiry experiences must be carefully designed and strategically guided along the way. In fact, well-designed inquiry experiences and

strategic interventions appear to be critical to teaching for understanding, and several research studies provide deeper insight into this reality.

The findings of Limberg and Alexandersson (2003) illustrate this point, concluding that in the absence of careful design and guidance during inquiry-based learning experiences, students stopped at fact finding, with only a few going beyond facts to achieve understanding. Of particular interest, the authors also noted that students used the term “facts” almost exclusively in their conversations, and that teachers and librarians rarely challenged this view of information as facts (p. 7). As a result of these findings, the authors theorized that “according to the school’s discursive practice, learning takes place through copying and memorizing text,” proposing that such practice may be, in fact, “detrimental to a view of learning as deeper understanding of some content” (p. 7).

Another telling example of the importance of carefully designed inquiry experiences comes from Harada and Yoshina (2004) who, over the course of their research, found that in the typical “about an animal” research projects, teachers and students were often both left dissatisfied with the end results. Teachers reported that students had merely “regurgitated” information; students agreed, stating that the assignment was “easy” and all that was required was to “copy the stuff” from the encyclopedia (p. 22). Koechlin and Zwann (2007) would certainly agree, citing that educators are all too aware that the common information tasks that make up regular practice in many classrooms lead students “to plagiarism or a low level regurgitation of facts and data” (p.80), often achieved at the expense of constructing personal understanding. Just the same, “similar projects yielding similar results are repeated year after year in hundreds of classrooms” (Harada & Yoshina, p. 22).

The implication for teaching is evident: carefully designed inquiry-based learning experiences that go beyond merely fact-finding and knowledge are essential to fostering understanding. The work of Wiggins and McTighe (2005) support these findings, furthering that the challenge for educators is indeed to make understanding more probable “by *design* rather than by luck or natural disposition” (p. 42). This leads one to ask: How does one design experiences that lead to meaningful understanding?

Elements of authentic inquiry-based experiences that facilitate understanding

Although there is no “one and only” or “cut and paste” template for designing inquiry-based learning experiences, there are elements of best practice common between inquiry experiences that lead to deeper understanding. Authors in this field of study propose that experiences that facilitate understanding generally center around: big ideas, essential questions, authentic experiences, rigorous learning, and, ongoing feedback, reflection and assessment. Although exploring these areas in depth deserves its own future work, the following section of this literature review will highlight some important considerations and key research in these areas.

Determining big ideas

When designing inquiry experiences to facilitate deeper understanding of content, there is general agreement in the literature that one of the first steps is determining the “big ideas” that will be uncovered in the study. Often referred to in the literature as big ideas, generative topics, essential learnings, or enduring understandings, the key to determining the big idea(s) is by first asking “What is most worth understanding?” (Perkins, 1993; Stripling, 2007). Essentially, big ideas encompass the “important ideas of the discipline and what students should understand

about those ideas” (Stripling, p. 44). Olson (2008) elaborates on this, stating that big ideas, or “take-home messages,” are the “central concept that should last long after experiences and facts have faded from memory” (p. 45).

According to Wiggins and McTighe (2005), big ideas should be viewed as “linchpins” or “conceptual anchors” that, when situated at the core of the discipline, hold together the related content knowledge, thus allowing for deep understanding (p. 66). The authors subsequently caution that when learning occurs in isolation, absent of big ideas, only “bits and pieces of inert facts” (Wiggins & McTighe, p. 66) that cannot be transferred or further used, will remain. For this reason, the authors have established that an important criterion for establishing the big ideas of a topic must be their potential to be transferred over time and across content areas (p. 69). In other words, big ideas should support the process of transfer that leads to understanding. As a result of this far reaching potential, when learning is framed around big ideas, the learning is situated in “meaningful contexts that relate to [students’] lives, communities, and world” (Saskatchewan Ministry of Education, 2010a, p. 9).

Teaching with big ideas in the forefront may be in direct contrast to much of the activity-centered or topic-centered teaching in schools today (Olson, 2008). Such pedagogy calls on educators to rethink their approach to teaching and learning, which is not always an easy task. An excellent illustration of this comes from Norton-Meier, Hand, Hockenberry and Wise (2008):

Kindergarten teacher: I had done a tree unit nearly every year of my teaching career. I LOVE THIS UNIT! My little students and I go on walks and identify trees by their leaves, study the parts of a tree, and the like. Then, one summer as I sat down to work with one of the graduate students on the project, he asked me, “So what is the big idea?” I was stumped. He continued, “Tell me, why is it important that my young son learn about

trees?” After some thinking, I replied, “Well, they are essential to people’s lives! They provide shade, food, and shelter and clean the air.” I realized the big idea has just fallen out of my mouth. But, I can’t tell you it was easy. It took me time to realize that the “cute” leaf identification activities that I have known and loved for so many years may not be helping my students to understand the “big ideas” of trees and science. Sometimes it is just as tough for us teachers to give up our prior notions about what is important to teach. (p. 20)

Certainly, identifying big ideas calls upon educators to shift their vision of what is important to learn and teach. However, as can be seen from the previous example, this does not suggest that educators have to abandon the curriculum or the units they love, but rather to reframe them. Wilhelm (2007) boldly suggests that teachers can “*always* reframe information-driven teaching into inquiry” (p. 38).

Framing essential questions

Big ideas naturally evoke inquiry questions that lead to deep understanding of content through genuine inquiry (Saskatchewan Ministry of Education, 2010a, p. 9). These essential questions, guiding questions or big questions, as they are sometimes called, are important to both the inquiry process and the ability to foster understanding. Stripling (2007) stresses the importance of questions, stating that “understanding is propelled by questioning” (p. 41).

Wiggins and McTighe (2005) consider essential questions akin to “signposts to big ideas” (p. 106). Essentially, according to these authors, well-formed essential questions should guide the way for students to explore the big ideas, themes, issues and problems that rest within the field of study (Wiggins & McTighe, p. 106). Essential questions should help student uncover the important ideas, not just cover the curriculum or “pat answers” (Wiggins & McTighe, p. 106).

Questions that foster genuine inquiry and deep content understanding must also lead to higher-order thinking (Saskatchewan Ministry of Education, 2010a, p. 9). According to Wiggins and McTighe (2005), essential questions stimulate thinking, promote further questions and inquiry, and simply cannot be answered in one short sentence. In the words of one third grader, essential questions are not the questions in which answers “fall out of your mouth—no thinking,” rather such questions “make your head hurt” and “put my brain to work” (Norton-Meier et al., 2008, p. 65).

As an additional benefit, essential questions also evoke student motivation. Kuhlthau, Maniotes and Caspari (2007) state that “when the learning is driven by students’ own questions and connects to their own understanding of the world, motivation is natural and intrinsic” (p. 30). According to Wilhelm (2007), the guiding question makes teaching easier by providing a “compelling hook” that reaches into the lives of the students and brings the curriculum to life (p. 42). Similar to his stance on big ideas, Wilhelm (2007) argues that all curricular standards can be reframed into essential questions to foster inquiry and understanding (p. 45).

Authentic learning

The literature highlights that the classroom and real world should no longer work in isolation. Instead, education must help students connect “school learning” to the work of that in the real world. According to Trilling and Fadel (2009), situating learning in authentic, or “real world” contexts, increases the “chance that a lesson will be remembered and can be used in other similar situations” (p. 31). The authors further argue that three decades of research on learning show that the context for learning is “much more influential than previously thought ... the setting in which a new skill or piece of knowledge is learned strongly influences whether or not that skill or knowledge can be applied elsewhere” (p. 31). As a result of such research, Trilling

and Fadel, as well as Darling-Hammond (2008), strongly advocate that school learning must better connect to the real life disciplines in which the knowledge resides.

The importance of authentic learning experiences is aptly reinforced in Saskatchewan's renewed curriculum where outcomes have been carefully worded to deepen student understanding of each area of study as a "living, breathing, contested, human discipline" (Saskatchewan Ministry of Education, 2010a, p. 12). These outcomes aim to uncover the questions, ideas and thinking considered high priority of experts in the field. Ultimately, students should think and behave like mathematicians, scientists, historians and so forth (p. 12).

Koehlin and Zwann (2007) would surely agree, stating "tasks must engage students in authentic real world performances that give them an opportunity to develop personal meaning and utilize their talents as well as their knowledge" (p. 81). Likewise, Wiggins and McTighe (2005) call upon educators to present students with opportunities to grapple with the real problems confronted by those in the field if understanding is to be "awakened" (p. 42), adding that "the great challenge in teaching is to enable such subtle adult understandings to become student understandings—without reducing the understanding to a mere simplistic statement for recall" (p. 7).

Academic rigour

Of utmost importance, inquiry that builds understanding requires students to engage in high-level cognitive experiences that take students beyond what they already know. The research by Perkins and Blythe (1994) identified task complexity as one reason that many classroom experiences fail to teach for understanding stating, "while teachers have always sought to teach with good activities, often those activities do not involve performances of

understanding... typically, they do not press the learners to think well beyond what they already know” (p. 7).

A research study by Lutz, Guthrie and Davis (2006) supports the work of Perkins and Blythe, showing a direct link between task complexity and student comprehension of reading. In their study, two groups of Grade 4 students who received high-level cognitive tasks far outperformed their Grade 4 counterparts who had received a traditional, basal reader approach to instruction with a focus on basic skills (p. 10). This is further supported in the research of Blumenfeld et al. (1991) which cited prevalence of low-level tasks as a major contributor to the lack of motivation and lack of understanding in schools (p. 371). The solution, according to Blumenfeld and colleagues (1991), rests in the creation of more complex tasks that engage students in the investigation and solution of real world problems through meaningful project-based learning experiences, or inquiry, that lead to deep understanding (p. 371).

Stated simply, students must be challenged to think critically and creatively. Evidently, Perkins (1993) states that “while understanding performances can be immensely varied, by definition they must be thought-demanding; they must take students beyond what they already know” (What is understanding? para. 7). Specifically, inquiry tasks must challenge students to use, apply, transfer, connect or think with knowledge. This means that assessment products must engage students in creating products and performances that show application and transfer of their learning to new contexts, using “authentic tasks in which they must present their solutions to the authentic problems” (Stripling, 2007, pp. 44-45).

Furthermore, understanding cannot be perceived as a worthy outcome for only a select few. Rather, Stripling (2007) believes that “all learners need opportunities to grapple with

conflicting evidence, complex issues, and ill-defined problems” (p. 52). To be successful, such complex tasks require support through ongoing feedback, reflection and assessment.

Ongoing feedback, reflection and assessment

Through the inquiry process, students require adequate opportunity to reflect, receive feedback and be engaged in ongoing and authentic assessment. Wiggins and McTighe (2005) caution that to teach for understanding requires that students do more than just the work; it requires students to self-assess, justify and critique what they do (p. 41). It calls for students who are self-reflective and understand themselves as learners (Stripling, 2007). The work of Bransford, Brown and Cocking (2004) synthesized a large body of research in this area, concluding that learners must take an active role in understanding by recognizing “when they understand and when they need more information” (p. 12). This important “metacognitive” aspect of learning, as it is frequently labelled, is a common and important thread throughout the literature on understanding and inquiry (Darling-Hammond, 2008; Kuhlthau, Maniotes & Caspari, 2007; Stripling, 2007). Bransford, Brown and Cocking (2004) explain how engaging students in self-assessment and reflection increases understanding of content:

Metacognition refers to people’s abilities to predict their performances on various tasks ... and to monitor their current levels of mastery and understanding (e.g., Brown, 1975; Flavell, 1973). Teaching practices congruent with a metacognitive approach to learning include those that focus on sensemaking, self-assessment, and reflection on what worked and what needs improving. These practices have been shown to increase the degree to which students transfer their learning to new settings and events (e.g., Palincsar and Brown, 1984; Scardamalia et al., 1984; Schoenfeld, 1983, 1985, 1991). (p. 12)

Teachers must also take an active role in the assessment process. Simmons (1994), the project manager for the Teaching for Understanding Project at Harvard, points out that teachers simply cannot assume that students understand; instead, teachers must continuously seek evidence of student understanding. Simmons proposes that it is this ongoing assessment that guides the process of understanding, thereby calling assessment “the horse that leads the cart of understanding” (p. 22).

As evident in the literature, teaching for understanding through inquiry-based learning requires thoughtful and careful planning. Consequently, it can be a complex process that benefits from the leadership of teacher-librarians and instructional leaders who can facilitate this multi-faceted process. Therefore, how do teacher-librarians and instructional leaders support teachers in the design of inquiry experiences that facilitate understanding, not simply regurgitation? The next section of the literature review will aim to further address this question.

Leading the way: Teacher-librarians and instructional leaders as collaborative partners in inquiry

There are certainly roadblocks along the pathway to teaching for understanding through inquiry. Certainly, one barrier is the traditional culture of schools where there is a mainstay focus on knowledge building. Stripling (2007) proposes that “changing the culture of a school to one that fosters understanding is a complex process that requires an advocate and leader” (p. 53). Although there are many individuals in school buildings who have the potential to step forward as an inquiry advocate and leader, the teacher-librarian is certainly a natural choice for this role. Teacher-librarians bring forth knowledge about content, resources and process that can surely challenge the school culture.

Equally, professional and scholarly literature clearly shows that implementing inquiry-based learning experiences can be greatly enhanced when supported by teacher-librarians rather than by individual teachers acting in isolation (Stripling, 2007, p. 51). Collaboration between teachers and teacher-librarians has been shown to be a fundamental component in an inquiry-based program (Kuhthau, 1999, 2010; Stripling, 2007). Certainly, teaching for understanding through inquiry challenges traditional and familiar pedagogies (Darling-Hammond, 2008; Koechlin & Zwann, 2007; Perkins, 1993). Consequently, teacher-librarians can support teachers to “carefully structure and scaffold learning experiences to ensure student success” (Koechlin & Zwann, 2007, p. 80).

In summary, teaching for understanding is a worthwhile goal and can no longer be a secondary concern for educators. Moving forward, it is essential that teacher-librarians apply this knowledge about understanding as they design tasks that foster understanding (Koechlin & Zwann, 2007, p. 82). Tasks that facilitate understanding pay attention to framing the learning around big ideas, establishing essential questions, ensure academic rigour, are grounded in authentic tasks and establish time for reflection, feedback and ongoing assessment. Clearly, inquiry is the framework for achieving that understanding. Todd (2006) states it well when he puts forth that “a personal mantra of every school librarian should be: celebrate the understood, not the found” (p. 5).

REFLECTION

Despite a strong rationale that places inquiry as the framework of teaching for understanding in the 21st century information-rich environment, implementation of inquiry-based learning into actual practice in the classroom and school setting is far from guaranteed. As reflected in the literature, inquiry does call on educators to shift their stance of teaching and

reframe their units in new ways, often taking teachers out of their comfort zone. The implementation of such change can be a difficult process in schools, especially when the proposed change challenges the traditional practices, values and beliefs of those being affected (Oberg, 2009). Certainly, one way to overcome this barrier is through collaborative partnerships of teachers and teacher-librarians, as reflected in the literature. However, collegial support is not enough.

Of additional significance to this paper and a source of inspiration for this reflection, research conducted by Marshall, Horton, Igo and Switzer (2009) discovered that even when teachers' values and beliefs support inquiry-based pedagogies, actual classroom practice does not necessarily coincide. Typically, teachers in their study dedicated 18-20% less time to inquiry-based learning than they believed ideal (Marshall et al., p. 590). Marshall et al. identified three "significant" factors that serve as contributors or barriers to the amount of inquiry-based learning in actual practice: grade level taught; support structures, including curriculum and collegial supports; and teacher self-efficacy (p. 591). The goal of this reflection will be to examine implications of the literature review as they connect to two factors: curriculum, and teacher learning that fosters self-efficacy. As a staff developer and instructional leader, as are all teacher-librarians, these two factors greatly influence the daily work of schools and libraries, and certainly merit further reflection.

A "curriculum of understanding"

In light of all renewed curriculum in Saskatchewan over the past three years, particularly in the fall of 2010 when all renewed curriculum documents in Grades 1 to 5 were unveiled, the next few years will be a critical transition period for the advancement of inquiry-based learning and teaching for understanding. According to Marshall et al. (2009), a curriculum that "promotes

inquiry instruction plays an important role in the amount of inquiry occurring in the classroom” (p. 588). Indeed, this appears to be the case in renewed Saskatchewan curriculum. According to the Saskatchewan Ministry of Education (2008), the renewed curriculum is one that “emphasizes teaching for understanding” (p. 1). In fact, “developing deep understanding within areas of study” (Saskatchewan Ministry of Education, 2010a, p. 1) was one of five principle goals achieved through the renewal process.

The link to inquiry as a framework for understanding is also firmly established in the documents. This is aptly reflected by the inclusion of inquiry-based learning as an important component of all effective programs. In addition, each and every renewed curriculum document contains the graphic, *Constructing understanding through inquiry*, which is shown in Figure 1.

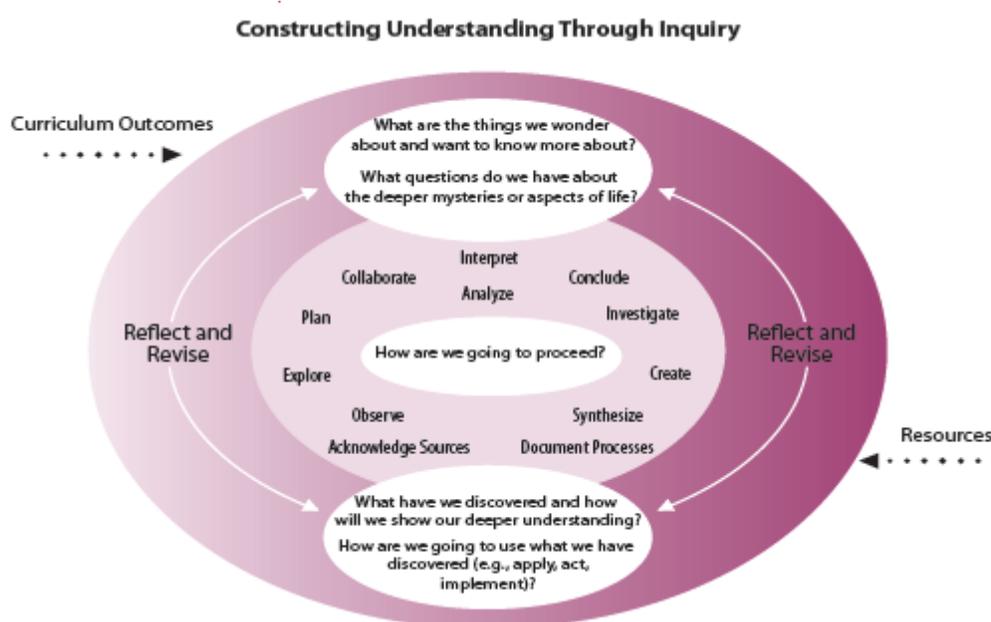


Figure 1. Constructing understanding through inquiry, from Grade 5 Social Studies curriculum document, by Saskatchewan Ministry of Education, 2010b, *Social Studies 5*, p. 16. Copyright 2010 by the Saskatchewan Ministry of Education.

This graphic is an excellent representation and reinforcement of teaching for understanding through inquiry. In fact, many of the verbs in the center of the graphic coincide perfectly with the

work of Harvard's Teaching for Understanding Project which expressed the idea that performances that take learners beyond information to "extend, synthesize, apply, or otherwise use what one knows in creative, novel ways ... include explaining, interpreting, analyzing, relating, comparing, and making analogies" (Wiske, 1999, p. 238). It is also evident the important role of questions is represented by the graphic through the prompts in the top circle. In addition, the center question "How are we going to proceed?" infers that understanding requires doing, a "how," and is not achieved by simply knowing.

Other structural changes in the curriculum further support teaching for understanding through inquiry. The first change can be identified by a greatly reduced number of outcomes. For example, the previous Grade 5 Social Studies curriculum included 52 major learning objectives and a further 77 unit objectives (Saskatchewan Learning, 1995). Today, renewed curricula have fewer than 20 outcomes at each level in any subject. Fewer outcomes allow students to delve deeper into content and achieve understanding. Gardner (as cited in Brandt, 1993) would agree, stating that "the greatest enemy to understanding is coverage...you've got to take enough time to get kids deeply involved in something so they can think about it in lots of different ways and apply it—not just at school but at home and on the street and so on" (p. 7).

Secondly, the term "understanding" is frequently referred to and defined in all curriculum documents and the companion document, *Renewed curricula: Understanding outcomes* (2010). According to Saskatchewan Ministry of Education (2010a), "deep understanding develops through thinking and learning contextually, creatively, and critically, in a variety of situations, both independently and with others" (p. 24). The Ministry of Education (2010a) further cites Leithwood, McAdie, Bascia and Rodrigue (2006) who state:

The complexity of teaching for deep understanding can be made clearer by an examination of constructivism, an approach to teaching and learning widely advocated today. ...

According to constructivists, students acquire fuller understanding if they are personally involved in building their knowledge. It is not enough that teachers go further into a subject; students must go with them, and they will only do so if they are engaged intellectually, emotionally, and in other ways. (as cited in Saskatchewan Ministry of Education, 2010a, p. 6)

Within individual curriculum documents, understanding is further defined. For example, in the *Social Studies 5* curriculum by the Saskatchewan Ministry of Education (2010b), understanding is both defined and strongly linked to a process of inquiry:

In social studies, students develop understanding by building on what is already known and use processes such as thinking contextually, thinking creatively, and thinking critically for initiating and engaging in inquiry and other projects. This curriculum is inquiry-based and students use their thinking skills to explore a range of questions, topics, issues, and themes in a variety of contexts. Thinking contextually, creatively, and critically enables students to make observations and decisions and to solve problems. (p. 4)

A further strength of the renewed curriculum is the inclusion of three broad areas of learning and four cross-curricular competencies. The broad areas of learning which include building lifelong learners, building a sense of self and community, and building engaged citizens, identify key student dispositions to be nurtured, such as “natural curiosity,” “discover and explore,” “a sense of wonder” and a “spirit of inquiry” (Saskatchewan Ministry of Education, 2010b, p. 2). The four cross-curricular competencies include developing thinking, developing identity and interdependence, developing literacies and developing social responsibility (pp. 3-

6). These competencies encourage student engagement in performances such as “generation of ideas,” “evaluating information and ideas,” and “interpreting the world and expressing understanding of it through words, numbers, images, sounds, movements or other representations.” (p. 5). These broad areas of learning and cross-curricular competencies certainly support the construction of understanding through inquiry.

Considering the strong position of the Ministry of Education in favour of teaching for understanding through inquiry, it certainly appears promising that the renewed curriculum in our province will strongly support the capstone work of this author. Indeed, there are many positive steps forward. Outcomes and indicators often begin with verbs such as “assess,” “interpret,” “analyze,” or “evaluate.” Moreover, students are occasionally prompted to “create,” or even to “conduct an inquiry,” generally pertaining to personally relevant topics. However, there is still room for growth. At times, indicators and outcomes are phrased to simply “locate,” “identify,” or “research” information. Although it is acknowledged that indicators must cover a depth and breadth of learning, which must include knowledge and skill building, learning should not stop there. Rather, as illustrated in Figure 1, learners must reach into the inner circle to create, analyze, conclude, interpret, and synthesize that knowledge, then represent their understanding as they “use what [they] have discovered (e.g., apply, act, implement).” By extending beyond simply accumulating knowledge, students will come to understand that content; increasing the likelihood that they will not only retain what was learned, but will be able to transfer and apply it to other settings.

As teachers move forward, I anticipate that an additional difficulty for teachers will be defining what’s most important for students to understand, or the big ideas, that encompass the central ideas of the discipline being studied. In fact, I have heard from teachers that this is

indeed the case. Absent of big ideas which firmly anchor the outcomes and indicators that get to the heart of learning, the indicators may become an isolated list of activities. My personal experiences framing big ideas, as well as essential questions and performances of understanding, have shown me that adeptness with these activities develops through practice and support from colleagues.

Specific strategies, techniques and tools may also be helpful in generating big ideas, essential questions and performances of understanding. Over the course of the Teaching for Understanding project, one useful strategy for identifying big ideas was the concept map (Wiske, 1999, p. 232). Some excellent examples of concept maps in action can be found in Chapter 3 of *Questions, claims and evidence: The important place of argument in children's science writing* by Norton-Meier, Hand, Hockenberry and Wise (2008).

As well, one strategy that has helped me over my personal learning journey goes back to the words of Olson (2008): What is the “central concept that should last long after experiences and facts have faded from memory?” (p. 45). Using sentence stems, such as this one or simply “Students will understand...” is a strategy also proposed by Wiske (1999). Finally, another excellent resource for reframing units into inquiry can be seen in Wilhelm’s (2007) “Just follow the yellow brick road: Planning steps” (pp. 41-74).

Unfortunately, the yellow brick road to inquiry appears to have a few ruts to work through yet, at least when it comes to curriculum. Nevertheless, we are heading the right direction. Indeed, now is the time to further this journey, with teacher-librarians and instructional leaders leading the way and helping to fill in some of the ruts as we go. In this last section of the reflection I want to further address the role of staff development in fostering teachers’ self-efficacy.

Self-efficacy: Teacher learning and the role of understanding

Teacher self-efficacy in inquiry learning is an important contributor to the implementation of inquiry-based learning in actual practice. Recently, I happened upon a quote that really sparked some thought for me: “Nothing can really change in schools unless teachers and administrators have learned new knowledge and skills, and are able to transfer that learning to the classroom” (Western and Northern Canadian Protocol, 2006, p. 69).

My connection was confirmed on the next page, when I further read: “Changing practices requires deep understanding on the part of educators” (Western and Northern Canadian Protocol, p. 70). This makes sense, I thought. Why should learning be different for adults than for our students?

As a staff developer, this realization has prompted me to reflect on “how,” or even “if,” the professional learning sessions I had carefully planned and facilitated over the years engaged teachers in performances that fostered understanding and allowed for transfer and application back into the classroom. Now placing my learning about understanding into a new context, I certainly see areas for future exploration and consideration.

A few implications of this capping paper carry forward into teacher learning: Teachers must construct understanding on their own, internally, to be able to transfer and apply this to a new setting (ideally, the classroom); teacher learning must engage teachers in thinking that extends beyond knowledge; teachers must engage in experiences where they “do.” Framing teacher learning around big ideas, essential questions, authentic and rigorous learning tasks, and ongoing feedback and reflection, as teachers would do for their students, will facilitate the process.

As I reflected further, I was reminded of the work I have done promoting professional inquiry with teachers in my division through the Middle Years Professional Inquiry Cycle (MY PIC) model and website. Although recently revised, and renamed the Collaborative Inquiry approach to teacher learning (Figure 2), reviewing this image has helped me to understand the

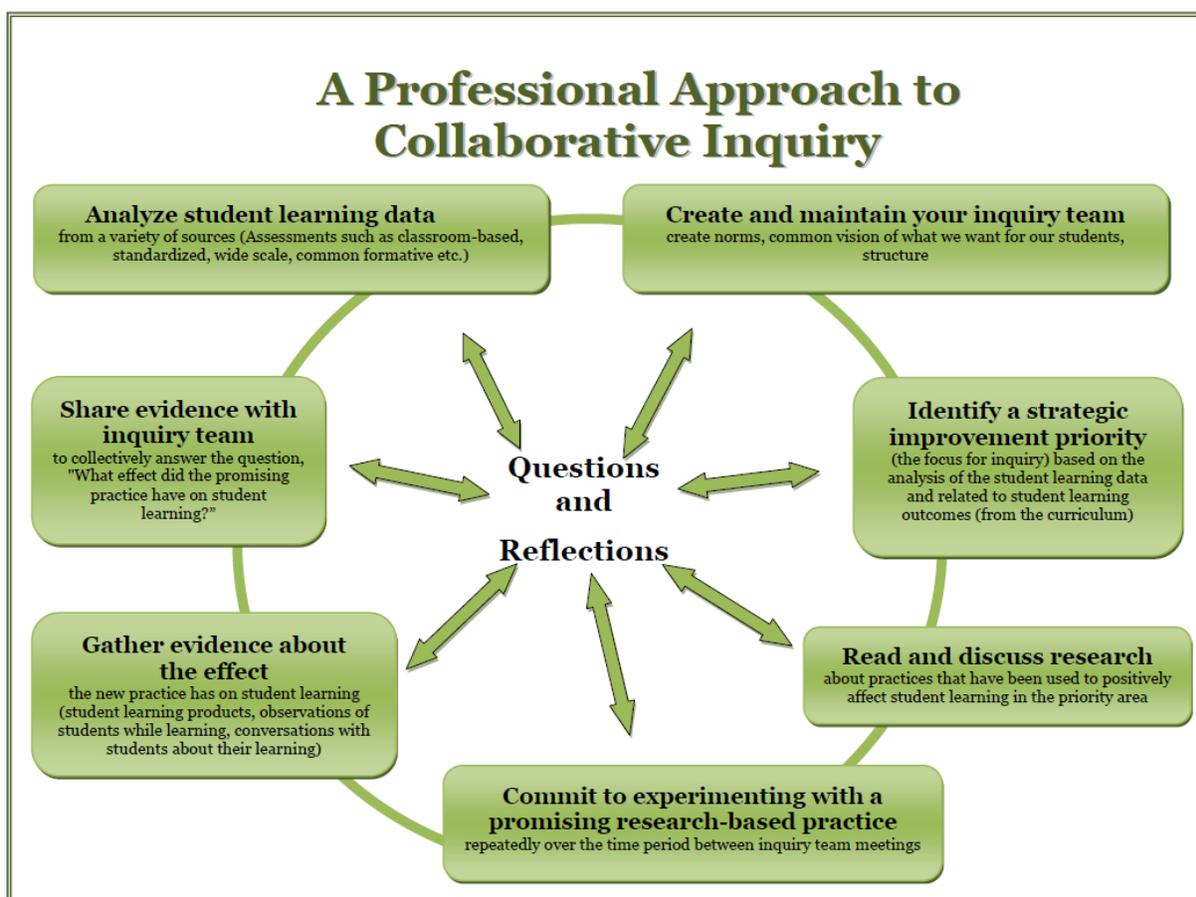


Figure 2. Collaborative inquiry approach, by Saskatoon Public Schools, 2010, unpublished. Copyright 2010 by Saskatoon Public Schools.

importance of teacher inquiry; indeed, if inquiry is the pathway to understanding for our students, it should be for teachers, as well. One reason this remains true for teachers, as shown in Figure 2, is that an important component of understanding facilitated through this approach is the need to “commit to experimenting with a promising research-based practice repeatedly over the

time period between inquiry team meetings.” Indeed, as teachers engage in their own performances of understanding, teachers will come to better understand their own learning and apply this into practice in the classroom.

Undeniably, the topic of professional development for teachers that supports understanding and encompasses the ideas brought forth in this capping paper is an area worthy of future exploration and discussion.

Conclusion

Teaching for understanding must become the new mainstay of education in the 21st century. Inquiry-based learning is indeed the pathway to understanding. However, implementation of inquiry-based learning in the classroom and school setting will benefit from the work of teacher-librarians and other school leaders who can scaffold the learning for teachers as they build their own understanding and self-efficacy in order to transfer their learning into practice. Meanwhile, a curriculum of true understanding is still needed to facilitate the process.

As I conclude this paper, I can state, with confidence, that I am not the teacher I used to be, nor am I the learner I used to be. As I move forward in my teaching and learning journey to apply and transfer the deep understanding I have achieved during this capping journey into my daily practice, I can only anticipate the teacher I will yet become.

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