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Decolonizing Aboriginal Education in the 21st Century
Décoloniser l'éducation des autochtones au 21e siècle

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Article abstract

Concerned by the need to decolonize education for Aboriginal students, the authors explore philosophies of Indigenous ways of knowing and those of the 21st century learning movement. In their efforts to propose a way forward with Aboriginal education, the authors inquire into harmonies between Aboriginal knowledges and tenets of 21st century education. Three stories from the authors' research serve as examples of decolonizing approaches that value the congruence between 21st century education and Indigenous knowledges. These stories highlight the need for two-eyed seeing, co-constructing curriculum for language and culture revitalization, and drawing from community contexts to create curriculum.

DECOLONIZING ABORIGINAL EDUCATION IN THE 21ST CENTURY

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ABSTRACT. Concerned by the need to decolonize education for Aboriginal students, the authors explore philosophies of Indigenous ways of knowing and those of the 21st century learning movement. In their efforts to propose a way forward with Aboriginal education, the authors inquire into harmonies between Aboriginal knowledges and tenets of 21st century education. Three stories from the authors' research serve as examples of decolonizing approaches that value the congruence between 21st century education and Indigenous knowledges. These stories highlight the need for two-eyed seeing, co-constructing curriculum for language and culture revitalization, and drawing from community contexts to create curriculum.

DÉCOLONISER L'ÉDUCATION DES AUTOCHTONES AU 21e SIÈCLE

RÉSUMÉ. Préoccupées par le besoin de décoloniser l'éducation offerte aux étudiants autochtones, les auteures examinent les philosophies sous-tendant les modes d'apprentissage autochtones et les mouvements éducatifs du 21e siècle. Dans le but de faire évoluer l'éducation proposée à la population étudiante autochtone, les auteures cherchent à concilier les savoirs autochtones et les principes éducationnels du 21e siècle. Dans cet article, trois histoires tirées des recherches effectuées par les auteures illustrent des approches valorisant l'harmonisation des théories éducationnelles du 21e siècle avec les savoirs autochtones. Celles-ci démontrent l'importance d'utiliser «l'approche à double perspective», d'élaborer conjointement un programme pour la revitalisation de la langue et de la culture et de s'inspirer du contexte propre aux communautés lors de l'élaboration des programmes.

> *Have you seen the sign out by the highway? It says* NO FRACKING WAY! *What I want is for my son to grow up and be able to decide whether to go to work for them or not. He needs to be prepared so he can make a choice.* (excerpt from field notes, June 2011).

As part of one author's work with the Mi'kmaw Kina'matnewey[1] (MK) First Nation Student Success Program (FNSSP), meetings were arranged in commu-

nities to hear parents' and other community members' goals for the education of children in the early childhood settings. The adults were urged to think beyond the need for their young children to learn the letters of the alphabet, to consider their hopes and dreams for the long-term happiness and success of their children. The epigraph above attests to one father's passionate response. The sign this parent was referring to reflected opposition to a process for extracting natural gas, proposed for an area near their community. The process entails the use of considerable amounts of fresh water and holds the risk of damage to the environment. As the community meeting proceeded, this father explained that to work for an oil company to make a good living might be the right decision for his son, as an adult, but that concerns over destruction of the environment should perhaps outweigh any immediate economic promise. What he wanted was for his son to be educated in such a way that he would be able to consider the different arguments and make a wise decision. He wanted his son to be knowledgeable about Indigenous values and beliefs, but he also hoped his son would understand the mainstream science and arguments surrounding issues and to have the school-based qualifications to be hired into any job he desired. This father's wish for his son reflects some of the complexity inherent in education for Aboriginal[2] children, wherein mainstream academic success of children is important, but the establishment of children's cultural identity is also essential (Stairs & Bernhard, 2002).

We are a group of three university-based researchers, one School Success Coordinator who works with the MK FNSSP, and one Mi'kmaw[3] educator who endeavours to bring language and culture into the MK community school in which she works. Each of us is committed to understanding and enhancing the experiences of students in the MK communities in Nova Scotia. We see a definite need to move forward with pedagogical approaches that decolonize education for Aboriginal students so that "First Nations learners [are nurtured] in linguistically and culturally-appropriate holistic learning environments that meet the individual and collective needs of First Nations" (Assembly of First Nations, 2010. p.10). We are troubled by the tendency in traditional mainstream education to teach skills stripped of context. We believe the teaching of decontextualized mathematics and literacy skills does not align with an Indigenous worldview which is holistic and interconnected, and, along with other researchers, we are concerned that such an approach to education is ineffective (Boaler, 2002; Collins, 2004; National Council of Teachers of Mathematics, 2000; Routman, 2003; Wilhelm, 2008). We have little conviction that students who learn numeracy and literacy skills in a decontextualized way will develop the critical thinking about mainstream science, for example, that the Mi'kmaw father wished for his son.

As we reflected on potential ways forward in Aboriginal education, we became intrigued by the goals of an initiative commonly referred to as "21st century education" (Jacobs, 2010). This approach to education has emerged from the

recognition that today's students (tomorrow's adults) must learn more than discrete bits of information and decontextualized skills to prepare them for the increasingly complex world of the future. With an emphasis on critical thinking, creativity, collaboration and communication, 21st century education moves beyond the technical/rational view of education (Schön, 1983). As we explored the tenets of 21st century education we began to see harmonies with Indigenous perspectives on education and wondered if this increasingly popular approach might provide educators with a clearer perspective on decolonizing Aboriginal education. Could this be a way forward?

In this paper, we delve into Indigenous knowledges and Indigenous perspectives in education and consider their decolonizing effect. We outline the specific ideas underpinning the notion of 21st century education and their influence on pedagogical and curricular trends in education. We find considerable concord between these two seemingly disparate emphases on learning, knowing, and doing. Although the ideas of 21st century learning are being touted as new, we argue that they are, in fact, rooted in very old ideas embedded in Indigenous knowledges. We offer three stories from our research and work in MK communities as examples of moments of congruence between 21st century education and Indigenous knowledges. Finally, we argue that the promises of both Indigenous ways of knowing and 21st century education may benefit all learners.

ON INDIGENOUS KNOWLEDGES AND 21ST CENTURY LEARNING

A central goal of Aboriginal education is to ensure that Aboriginal children maintain their cultural identity while achieving their formal education. Research on the education of Aboriginal students has shown that schools that respect and support a child's culture and language demonstrate significantly better outcomes for students (Greymorning, 2001; Haig-Brown, Hodgson-Smith, Regnier, & Archibald, 1997; McCarty, 2002; Paul-Gould, 2012; Sock, 2012). Institutionalized policies of colonization, assimilation, integration, racism, and systemic discrimination have eroded the nature, scope, and effective functioning of the cultural systems of Aboriginal peoples leaving a legacy of on-going oppression, suffering, and torment of Canada's Aboriginal population (Comeau & Santin, 1995). Decolonizing perspectives rooted in Indigenous knowledges are one way to bring about greater success for Aboriginal students while preserving cultural identities and Indigenous languages.

Decolonizing perspectives: A way forward

As European settlers colonized North America and the many groups of Indigenous peoples living here over the past several hundred years, European knowledge and ways of learning were imposed through oppressive institutions such as residential schools (Regan, 2010). Indigenous ways of learning were

negated and diminished, as were Indigenous knowledges. Today, there are efforts to apply an understanding of Indigenous perspectives on learning in schools (Lipka & Adams, 2004; Lunney Borden, 2010), and support materials have been developed to help teachers decolonize their practices (McGregor, 2012). Emerging research is affirming that a decolonized approach can be effective (Kisker et al., 2012), yet much remains to be done in order to ensure more widespread adoption of these ideas.

A dominant theme emerging from much of the literature is that Aboriginal education should seek "to heal and transcend the effects of colonization" (Cajete, 2000, p. 181). It has been argued that Aboriginal education cannot ignore the reality of colonization but rather must address the issue directly (Hampton, 1995). Aboriginal education needs to be a decolonizing form of education. Decolonization can be seen as a process of "deconstruction and reconstruction" (Battiste, 2004, p. 10) that "engages with imperialism and colonialism at multiple levels" (Smith, 1999, p. 20). This demands the critical examination of the hegemonic structures of mainstream education that continue to perpetuate the values of colonialism (Battiste, 2004; Bear Nicholas, 2001).

Battiste and Henderson (2009) have argued that Indigenous languages hold the key to an Indigenous worldview and philosophy, as do the ceremonies. They believe that the learning spirit becomes nurtured and animated in an Indigenous knowledges setting and, when these knowledges are naturalized, Aboriginal people have the capability to decolonize themselves both at an individual level and at a collective level. Yet, Battiste and Henderson have noted that although Indigenous knowledges have been brought from the margins in a political act of empowerment and decolonization, more work is needed:

> The Indigenous renaissance has deconstructed and discredited the traditional Eurocentric views of Indigenous peoples and their heritage as exotic objects that have nothing to do with knowledge, science, or progress. However, it has not displaced the educational empire of EK [European knowledge]. (p. 10)

Thus, moving towards decolonization requires extensive transformation of education where learning is rooted in Indigenous knowledges rather than treating these knowledges as an "add-on" or "other" way of knowing.

Understanding Indigenous knowledges

We use the term Indigenous knowledges in its plural form so as not to imply that one should see Indigenous peoples as "all the same" or make the false assumption that what is true of one Indigenous community is also true of another. Yet, Indigenous communities have a shared history with colonization and have shared values with respect to their relationship with the natural world. Thus, it can be argued that Indigenous knowledges share some commonalities but also have unique contextually based features.

To show the contrast between Eurocentric knowledge and Indigenous knowledges, Battiste (2002) presented the following explanation:

> Indigenous knowledge comprises the complex set of technologies developed and sustained by Indigenous civilizations. Often oral and symbolic, it is transmitted through the structure of Indigenous languages and passed on to the next generation through modeling, practice, and animation, rather than through the written word.... Indigenous knowledge is typically embedded in the cumulative experiences and teachings of Indigenous peoples rather than in a library. (p. 2)

Doolittle (2006) has reiterated this notion of the complex nature of Indigenous knowledges, claiming that "Indigenous thought is all about developing and building up sophisticated, complex responses to complex phenomena such as the weather, animal migratory patterns, healing, and human behaviour" (p. 22).

Similarly, Dei, Hall and Rosenberg (2000) have argued "Indigenous knowledges speak to questions about location, politics, identity, and culture, and about the history of peoples and their lands" (p. 4). They have argued that Indigenous knowledges can be conceptualized as:

> a body of knowledge associated with the long-term occupancy of a certain place. This knowledge refers to traditional norms and social values, as well as to mental constructs that guide, organize, and regulate the people's ways of living and making sense of their world. It is the sum of the experience and knowledge of a given social group, and forms the basis of decision-making in the face of challenges both familiar and unfamiliar. (p.6)

In these characterizations of Indigenous knowledges, we can see that they are rooted in context and experience, involve sophisticated and complex responses to the natural world, emerge in relation to place, and are embedded in Indigenous languages. Lunney Borden (2012) has argued that although many Aboriginal children come to school speaking English, it would be false to assume they are also thinking in English ways. Rather, their ways of thinking are much more consistent with those embedded in their Indigenous language. This notion is supported by Denny (1981) and Barton (2008) who have advocated that when educators understand the structure of Indigenous languages they can gain insight into ways to support mathematical understanding for Indigenous students. Understanding these aspects of Indigenous knowledges enables one to envision how they might influence Indigenous ways of learning.

Indigenous ways of learning

It would be false to assume there is one specific way to teach Aboriginal children. Research on Aboriginal learning styles was popular in the past (Pewewardy, 2002), yet such research has been critiqued as promoting a simplistic belief that a one-size-fits-all approach to teaching and learning exists (Battiste, 2002). It is important to maintain a critical approach to literature characterizing Indigenous

ways of learning. We have attempted to bring that critical lens to this review of literature in an effort to avoid stereotypical generalizations.

Battiste and Henderson (2009) note that Indigenous views on learning characterize them as sacred, holistic, and a lifelong responsibility. From an Indigenous viewpoint, every child is unique in his or her learning journey and knowledge construction (Battiste & Henderson, 2009). Further, ceremonies, traditions and daily observations are all understood as essential to learning in Indigenous cultures, and the spirit-connecting process allows gifts, vision, and spirit to emerge from the individual.

Cajete (2000) has explained that for the Pueblo people, education was about finding your face and your heart and developing a strong foundation upon which to express both. Finding your face implies connecting with who you are, where you come from, and discovering your unique sense of self. Finding your heart refers to finding your vocation, that is, something you could do with passion that would also allow you to contribute to the life and survival of the community.

In an examination of Mi'kmaw approaches to learning mathematics, Lunney Borden (2010) argued that learning stems from meaningful personal connections for students that attend to concepts and ways of knowing embedded in Mi'kmaw language. Such personal relevance in learning has been long advocated by scholars and community leaders who focus on Indigenous education (Assembly of First Nations, 2010; Battiste, 1998). Each of the points above show how Indigenous approaches to education are at odds with the traditional Eurocentric approach to learning which seeks to conform each child to a standard learning progression. Yet the opposition to such standardization is not restricted to only those interested in Aboriginal education, as the following section explains.

21st century education

> Are you confident you can design a curriculum which will equip me to live in my world?... I am five years old and I am sitting in one of your classrooms today (Beare, 2002, "I Am the Future's Child," no para.).

The *I Am The Future's Child* essay (Beare, 2012) and the many iterations of the video, *Did You Know*? (Fisch & McLeod, 2007), speak urgently to adults, calling them to acknowledge that the world and the experience of most people in the world have changed drastically. A growing number of researchers (Gardner, 2007; Jacobs, 2010) are asking educators to look closely at the way people are interconnected through the Internet, ponder the exponential rate of information-creation, consider looming planetary crises, and admit that we are raising children to work as adults in jobs that have not yet been conceived of, to solve problems that we do not yet know exist. Many people are coming to realize that the current system of schooling does not adequately prepare

our children to be successful in a rapidly changing, globally interdependent world (Brown, 2009).

Current "school structures are fundamentally based on an antiquated system established in the late 1800s" (Jacobs, 2010, p. 1). As Jardine, Friesen and Clifford (2008) contend, "what began with such enthusiasm and hope around a century ago in the organization and imagining of schooling has simply worn out" (p. 14). So, what should replace the old ways of schooling?

Leaders and theorists have been analyzing the major changes in the world and proposing how to adapt schooling so all young people are well educated for the 21st century. Stewart (2010) examined five global trends that are "transforming the context for future generations" (p. 98). He highlighted economic trends (international marketplace), science and technology trends (digitization of production and international teams), demographic trends (immigration and emerging economies), trends in security and citizenship (borderless issues), and trends in education (global talent pool), suggesting "education as usual won't do" (p. 101).

In contrast to Stewart's (2010) emphasis on preparing students for a changing work place, Cloud (2010), another advocate of 21st century education, has written about the need to educate for the sustainable future of the planet, with an emphasis on cultural preservation and transformation, responsible local/global citizenship, sustainable economics, living within ecological/natural laws and principles, multiple perspectives, and a sense of place.

21st century curriculum

Various authors have offered lists of knowledge, skills and dispositions that complement Stewart's (2010) and Cloud's (2010) proposals (Baker, 2010; Kunzman, 2012; T. Wagner, 2012). Digital literacy has been commonly identified as an area of need for the 21st century because students will use technology as a source of information and as a vehicle or tool for communication. However, students will also need to develop competencies in multicultural, informational, aural, visual, emotional, ecological, physical, nutritional, and financial literacies (21st Century Schools, 2008). Throughout the literature, a strong emphasis is placed on promoting creativity, innovation, and collaboration, skills that may have been emphasized with students from upper classes (Anyon, 2005), but should be considered as essential for all students.

Some educational analysts have looked to the processes of highly successful 21st century companies around the world and suggest that schools should emulate these processes, in particular creativity and innovation (Brown 2009). T. Wagner (2012) stated, "A nation's long-term economic health depends on innovation" (p. 66). Some would argue that the future of the planet, in social, environmental, and political terms, also depends on innovation. Wagner has suggested that creativity and innovation may be intentionally nurtured

in schools through an emphasis on collaboration versus individual achievement, multidisciplinary learning versus specialization, trial and error versus risk avoidance, creating versus consuming knowledge, and intrinsic versus extrinsic motivation.

Friesen and Jardine (2009) have cautioned that generic skills may only be acquired through connections with specific content and the disciplines' ways of knowing. Students will develop their multiple literacies, and their creative, innovative, problem-solving, and collaborative skills, when they are engaging with a topic of some significance to them and to the world. Which content is of most value is widely contested, but there seems to be agreement that a stripped down emphasis on discrete skills, and a narrow curriculum of reading and mathematics, does not serve students well, either in achieving high scores on international exams or in preparing them for their current and future lives (Munson, 2011).

21st century instruction and assessment

For some time now, no matter what the specific content may be for a particular grade level or subject area, an emphasis on the importance of students' learning concepts or enduring ideas, rather than discrete facts, has been evident. Wiggins and McTighe's (1998) work, *Understanding by Design,* was in the forefront of this emphasis on conceptual learning and understanding, as opposed to memorization. Their work has been echoed in current suggestions about 21st century education (Brown, 2009; Singh, 2002).

Closely associated with the notion of students' learning concepts rather than discrete facts is the focus on inquiry as a model for instruction (Goos, 2004; Singh, 2002). Barell (2003) has stated, "We need inquisitive people to grow into this new millennium" (p. 18) and claimed "wonder, inquiry, skepticism, and doubt [are] the pillars of our civilization, the promise of our future on the planet" (p. 22). Learning through inquiry opens up the written curriculum. The teachers and the students become co-constructors; the end point is not pre-determined, and as such the curriculum is sometimes termed emergent or generative. This instructional model requires the teacher to let go of some of the leadership in the classroom, while still being accountable to learning goals set by the province (Stacey, 2009).

The notions of generative or emergent curriculum mesh smoothly with the way young people today collaboratively create content in the virtual world. Wilmarth (2010) has observed that "by participating through blogs, wikis, podcasts, video productions on sites such as YouTube, email, text messaging, and shared online photostreams... our students are no longer primarily consumers of content... they are content creators" (p. 82). He further proposed the "messy, nonlinear, highly organic process of learning... seems to be at the core of what it takes to be a successful citizen of the 21st century" (p. 95).

In terms of assessment in 21st century education, students are being taught to take ownership of their learning through goal setting and self-assessment in recognition that they will be lifelong learners who will need to self-monitor progress (Brown, 2009). Jacobs (2010) has suggested that assessment formats in schools should mirror the products and performances of adults currently working in the various disciplines. "21st century social scientists, scientists, mathematicians, artists, writers, language specialists, musicians, and business men and women might produce the following: documentaries, podcasts, web sites, digital music compositions, blogs, etc." (pp. 23-24) and so should the students. This perspective moves us away from traditional forms of assessment. Discrete skills are assessed not individually but through their integration into meaningful, authentic tasks.

Seeing harmony and alignment

As we examined both Indigenous perspectives on learning and principles of 21st century education, we began to see alignment between the two approaches to education. We argue that teachers can meet the needs of the 21st century learner through the inclusion of Indigenous perspectives in schools.

First, we note that a 21st century approach to education recognizes the value in knowing multiple languages, including Indigenous languages, and holds respect for diverse cultures, acknowledging the need for cultural preservation. We see this as being in harmony with calls for education originating in an Aboriginal perspective that enable Aboriginal students and others to value their own cultures and come to know and respect the world around them. Such respect for diversity requires an authentic way of coming to know one another in the global community. 21st century learning requires that all students begin to see with multiple perspectives, by coming to know one another in ways that do not treat one knowledge as *the* knowledge and all other knowledge as *other* (Battiste, 1998). This means that all students should be learning to understand multiple points of view, exploring phenomena from a variety of cultural worldviews and engaging in intercultural dialogue.

Second, we see that both Indigenous perspectives and 21st century approaches call for education to emerge from context and appreciation of the interconnectedness of all things. Both approaches acknowledge that learning is rooted in place. Understanding the local context is prerequisite to understanding the global context.

Finally, we see that both Indigenous perspectives on education and 21st century approaches to learning acknowledge the need for education to help students develop "sophisticated, complex responses to complex phenomena" (Doolittle, 2006, p. 22). 21st century education emphasizes creativity and innovation, with regards to authentic and relevant issues, in collaborative settings. Indigenous perspectives on education call for holistic approaches to learning and recognize

that Indigenous knowledges are embodied in "a web of relationships within a specific ecological context" (Battiste, 2002, p. 14).

In this discussion, we have noted three ways that Indigenous perspectives on learning and principles of 21st century education align. We want to be cautious with our claims and not suggest that by following principles of 21st century education, educators are fully addressing the needs of Indigenous learners. Decolonizing education requires a commitment to Indigenous perspectives throughout the curriculum. We argue that integrating Indigenous perspectives drawn from ancient wisdom embedded in these very old ideas can enhance 21st century approaches.

EXPLORING THESE ALIGNMENTS IN THREE CONTEXTS

We have proposed an alignment between the two major conceptual frameworks of this paper, Indigenous knowledges and 21st century education. We now develop three accounts drawn from recent research data, each of which involved one of us as a researcher. The research sites were three Mi'kmaw community-based education systems, and we focus in on one small aspect of each school system to reflect the larger whole. The purpose of these vignettes is to foreground the harmony between Indigenous ways of knowing and 21st century learning, while emphasizing the ways Mi'kmaw parents, educators and Elders exemplify this harmony in their own communities. There are powerful beliefs and movements related to education afoot in Mi'kmaw communities that will benefit young people of those communities, positioning them well for fulfilling lives and promising careers in the 21st century.

The first account, *Two-eyed seeing: A parent's wish*, (introduced at the beginning of this paper) is taken from field notes of a study undertaken by one of the authors in 2010 to explore directions for programming in early childhood education in Mi'kmaw communities. One aspect of that study was community meetings to hear parents' and other community members' goals for the education of children in early childhood settings. The excerpted quote illustrates the ways parents expressed the imperative for their children to be able to consider multiple perspectives and think critically as they made important decisions.

The second account, *A Grade Two Science Lesson in a Mi'kmaw Immersion Classroom: Integrating Indigenous and European Knowledges*, draws on a field note from a 2006 study highlighting the exemplary practices of teachers in a Mi'kmaw immersion program (Murray Orr et al., 2013). An important part of that study was time spent by the researchers in Mi'kmaw immersion classrooms, observing and later discussing lessons with teachers. Examination of the field note revealed ways the Mi'kmaw immersion program is reflective of 21st century learning characteristics, such as a valuing of local knowledges within a broader context, and a conceptualization of both teacher and students as active agents in the learning process.

The third vignette, *Three and a Thumb = Pi*, describes a lesson that was developed from a conversation that one of the authors had with an elder about making quill boxes. This conversation was part of a larger research project that explored the mathematics inherent in Mi'kmaw communities (D. Wagner & Lunney Borden, in press). This lesson serves as an example of curriculum rooted in community knowledge that connects the local to the global.

Two-eyed seeing: A parent's wish

During a community meeting discussion of the educational goals for the children, one father expressed the need for his son to have strong academic skills as well as a strong cultural identity. This is a wish shared by many parents. The report of the National Panel on First Nation Elementary and Secondary Education for Students on Reserve (2012) states, "appropriate and effective education is a universal entitlement of children because it enables them to choose for themselves what they will become committed to, and it gives them the ability to pursue their life aims" (p. 29). In the following statement Bartlett (2012) discusses two-eyed seeing, a concept that she and Mi'kmaw Elder Albert Marshall have made known, a notion

> which encourages learning to see from one eye with the best in the Indigenous ways of knowing and from the other eye with the best in the mainstream ways of knowing, and most importantly, learning to see with both eyes together – for the benefit of all. (p. 1)

A decision made with the future, ongoing health of the earth in mind is reflective of Indigenous ways of knowing. In a report from the International Institute for Sustainable Development, the Aboriginal authors explained, "we cannot simply think of ourselves and our survival; each generation has a responsibility to ensure the survival for the seventh generation" (Clarkson, Morrissette, & Régallet, 1992, p. 12). This notion of the importance of a long-term sense of responsibility for the earth is also congruent with the tenets of 21st century education. White (2004) has written about the need for all children to develop an environmental ethic or a sense of stewardship for the earth, contributing to their *ecoliteracy*, one of the literacies thought to be essential for the 21st century (21st Century Schools, 2008)

Two other closely connected aspects of 21st century education are reflected in the Mi'kmaw father's wish. One is critical literacy and the other is ethical citizenship. The need for these skills is a burgeoning topic in 21st century educational thought (Baker, 2010; Wilmarth, 2010). Some of this concern arises due to the increasing amount of information that is now available. Sheskey (2010) wrote,

> students in today's schools can access all the information they need to know, but they must learn how to ask the right questions... about how to solve the world's problems. (pp. 208-209)

Asking the right questions requires citizens who think ethically, "take personal responsibility for generating an ethical solution... and... prepare for possible repercussions of having acted in what one considers an ethical manner" (Sternberg, 2012, p. 36-37). Scholars writing about 21st century education ask, how do children develop an ethical stance? Ferrero (2011) described the importance of studying the humanities, in particular, history. "Studying the history of the society or civilization to which we belong helps us situate ourselves in a story bigger than ourselves, recognize our inheritance, and deepen our identification with those who share that inheritance" (p. 25).

In writing about the need to rethink school curriculum for the 21st century, Costa and Kallic (2010) explained,

> A fundamental shift is required from valuing right answers as the purpose for learning, to knowing how to behave when we don't know answers – knowing what to do when confronted with those paradoxical, dichotomous, enigmatic, confusing, ambiguous, discrepant, and sometimes overwhelming situations that plague our lives.... The critical attribute of intelligent human beings is not only having information, but also knowing how to act on it. (p. 223)

The example of the Mi'kmaw father's wish for his son to be able to make honourable decisions, when there is no obvious clear path ahead, is not solely an Indigenous issue. All future citizens, individually and as a collective, will face challenging problems and be involved in complex decision-making.

A grade two science lesson in a Mi'kmaw immersion classroom: Integrating Indigenous and Western knowledges

> In a Grade 2 Mi'kmaw immersion classroom in a Mi'kmaw community in Nova Scotia, students were gathered on the carpet for a read aloud at the beginning of a science lesson. The teacher read *Nikjawiknejewapu*, an informational text about oranges that had been translated into Mi'kmaw, while children listened attentively. The book had photos of the growth of an orange, beginning from a child eating an orange and planting the seed in a pot of soil through the plant's development and finally to the orange, ready to eat, on the plant. The Mi'kmaw translation of the several lines of text on each double-spread page had been typed, printed on white paper, and glued over the English text, a common practice in the Mi'kmaw immersion program at this school, as published materials in Mi'kmaw were almost non-existent. The teacher read the book through in Mi'kmaw, showing students the photos and text as she read. She then highlighted new Mi'kmaw vocabulary and asked the students for connections and questions, ensuring their comprehension. They discussed in Mi'kmaw seeds and plant growth and various other fruits that grow in different ways from seeds. (Excerpt from field notes, June 2, 2006)

This moment in a Mi'kmaw immersion program is an example of a powerful movement in that Mi'kmaw school and community to integrate Mi'kmaw knowledge and language with Western curriculum and practices. The adaptation of the information texts developed by mainstream publishers can be complex

because the content may not be relevant for the particular Aboriginal students (for example, oranges are a tropical fruit not grown in Nova Scotia). The use of strategies such as the read aloud and subsequent conversation illustrate the ways in which useful aspects of Western curriculum and instruction are incorporated in this classroom. The text-to-self and other connections made during the conversation and the ways students were encouraged to develop their own questions about the text are reflective of exemplary practices used in provincial elementary classrooms across Canada. At the same time, the valuing and central place of Mi'kmaw language and knowledge are integral to this lesson, as the language is the vehicle of the lesson, and the students' local context is valued in the discussion about what they know about how plants grow, not only the orange plant, a plant not native to Nova Scotia, but about plants found in their community, their local context. This lesson is an example of the ways teachers bring together Indigenous and European knowledges to enable children to engage in the two-eyed seeing conceptualized by Marshall and Bartlett (2012).

The teacher and learners took on active roles as curriculum makers (Clandinin & Connelly, 1992) in this classroom. She and her colleagues created resources, developed materials, taught and engaged students, and fostered caring classroom environments (Murray Orr et al., 2013). While attending to curriculum outcomes from their province's Department of Education, they also held Mi'kmaw language, knowledge, and values in the center of the lessons and lives of the students and teachers in the classroom. They invited students to become curriculum makers, involving them in bringing the local community context into lessons.

The idea of teachers and students as curriculum makers fits well with the philosophies of both 21st century education and Indigenous ways of knowing. 21st century education is often connected with a focus on creativity and collaboration (Jacobs, 2010). When teachers bring subject matter to life through collaborative meaning making in read alouds, conversations and other activities, the classroom is a place of creativity. Shared knowledge making, such as is developed in conversations like the one in this Grade 2 class, promotes a collaborative approach to learning. The use of Mi'kmaw language and contexts in this lesson reflects a valuing of global competencies needed in the 21st century, including a knowledge of multiple languages, cultures, and regions of the world (Stewart, 2010).

Indigenous knowledges value harmony with the environment and the understanding that knowing is tied to one's particular context (Wilson, 2008, Kovach, 2010). This teacher and her students and fellow teachers shaped a curriculum that embodies the language and place of the Mi'kmaw community in which they live, the place that is central to their lives and ways of knowing.

Implicit in the existence of this Mi'kmaw immersion program and others like it is the view that Indigenous languages, knowledges, and cultures are in grave danger (Paul-Gould, 2012; Sock, 2012) because of the dominant colonizing power of mainstream education systems, both historically and in current times. The efforts to stem the loss of language, culture, and knowledges arise from a profoundly decolonizing vision on the part of those who lobbied for the Mi'kmaw Immersion program and who work diligently to continue to develop and promote it every day in the school and community (Tompkins & Murray Orr, 2011).

Three and a thumb = Pi

The late Dianne Toney was a Mi'kmaw Elder who made beautiful boxes from porcupine quills, commonly called quill boxes. During a conversation with one of the authors about mathematics in the Mi'kmaw community, she explained that she made quill boxes by beginning with a circle top and starting her pattern in the centre. She then explained that she made the ring for the top from strips of wood. To ensure the ring was the right size, Dianne said she would measure three times across the circular top and add a thumb. She claimed this would make a perfect ring every time.

This conversation with Dianne was the inspiration for inviting Aboriginal children to have similar conversations with Elders in their communities through a project known as Show Me Your Math (Lunney Borden & D. Wagner, 2011). Show Me Your Math is a program that invites Aboriginal Students in Atlantic Canada to explore the mathematics that is evident in their own community and cultural practices. Through exploring aspects of counting, measuring, locating, designing, playing, and explaining (Bishop, 1991), students discover that mathematics is all around them. Each year students gather for the annual mathematics fair and celebrate the work they have done.

The conversation also inspired the author to develop a junior high mathematics lesson, and later an inquiry unit, that began with this story of Dianne's quill boxes and led students through an investigation to explore why this "three and a thumb" relationship exists between the circumference and the diameter of circles, and eventually to an exploration of pi. This activity allows students to draw parallels between the Elder's knowledge and the concept of pi as taught in school without privileging one over the other. This lesson serves as an example of how mathematics can emerge from an Indigenous context rather than being imposed upon an Indigenous artefact.

Similar to the science lesson described in the previous vignette, this lesson draws on global competencies for the 21st century (Stewart, 2010), in particular a commitment to learning about cultures of the world and the mathematical activities that have emerged in those communities. It also provides an opportunity to preserve cultural knowledges and highlights the connections from

one generation to the next in emphasising that this knowledge had been passed down to Dianne. Yet, this lesson differs in that it is not a modification of a lesson developed in a non-Indigenous cultural context, rather it is rooted in the community context and allows students to consider this community knowledge first and then to bring that learning alongside mathematical knowledge that has emerged in other parts of the global community. Thus in light of Ferrero's (2011) emphasis on providing an opportunity for students to situate their own history within that wider global community, students who participate in this lesson see the value of their own mathematical heritage and are able to connect this knowledge with similar ideas developed elsewhere. Such an approach is decolonizing for Mi'kmaw students.

As part of the professional learning associated with FNSSP and the Show Me Your Math program, this task and the related inquiry unit have been shared with middle years' teachers to implement in their classrooms. The response from teachers has been positive and has led to requests for more lessons that draw on community stories to develop mathematics knowledge. With students conducting mathematics research in their own communities through intergenerational conversations, they become the creators of curriculum and are using digital technologies to tell their stories. Drawing from students' Show Me Your Math projects and from follow-up conversations with Elders, inquiry units are being developed (see http://showmeyourmath.ca/inquiry) that draw on community traditions to begin with the local and make connections to the global. These units are rooted in Indigenous knowledges while highlighting the connections to other cultural knowledges. Furthermore, these units are holistic, drawing on outcomes from a variety of content areas to explore concepts in a complex rather than compartmentalized way. Beginning with the stories of community has provided a way forward as teachers and researchers work together to decolonize mathematics education.

CONCLUDING THOUGHTS

In this article, we have described three vignettes from three Mi'kmaw communities. In the first vignette, a Mi'kmaw father's wish for his son illustrates the importance of integrating Indigenous knowledges alongside European knowledge in the curriculum. The second vignette reflects the determination of one Mi'kmaw community to achieve this wish while revitalizing the Mi'kmaw language through a successful immersion program. The third vignette reveals how Indigenous knowledges may be the starting point for curriculum making. In each of these vignettes, we have highlighted the congruence between Indigenous knowledges and 21st century education.

For many years, Mi'kmaw and other Indigenous knowledges and histories have been ignored in mainstream society; they have been seen only in the historical context and not in a favorable or accurate manner. Through decolonization,

there is hope for empowerment of Mi'kmaw and other peoples with a deep sense of pride, belonging, knowledge, confidence, and a strong identity deeply entrenched in Indigenous ways of being. Decolonizing approaches can enable Indigenous peoples and all peoples to be educated in a way that honours identity and culture as we become responsible and productive citizens of the world guided by such values as love, respect, honesty, humility, courage, wisdom, and compassion in order to live in harmony with Mother Earth and all her children.

We see a close alignment between Indigenous knowledges and notions of 21st century education. We hope that the burgeoning world-wide concern for an education that prepares children for the uncertainties and complexities of the 21st century will renew respect for Indigenous knowledges and serve to decolonize education from the tyranny of belief that "wisdom and knowledge come through separation and classification as is the case in European thought" (Haldane, Lafond & Krause, 2011, p. 33). Increasingly, pockets of innovation around the world apply curricular and instructional approaches that reflect the tenets of Indigenous knowledges and 21st century education. For example, the early childhood programs of Reggio Emilia, Italy, embody beliefs in the competency of the child, the importance of place, parents, and community, and responsive, complex curriculum (Edwards, Gandini & Forman, 1998). These beliefs echo Indigenous perspectives as well as ideas thought to be important for the 21st century learner. The three vignettes examined in this paper— a father's dream for his child's future ability to see with two eyes, an immersion classroom wherein the children and teacher co-construct content grounded in context, and the development of curriculum that emerges authentically from Indigenous knowledges—are offered as examples of Indigenous ways of knowing underpinning and enhancing students' preparation for the future. Indigenous knowledges, as seen in these contexts, are not stagnant or ancient. Rather, they hold essential information that can guide us in the 21st century and beyond. As Brant Castellano (2000) has noted, "The knowledge that will support [our] survival in the future will not be an artifact from the past. It will be a living fire, rekindled from surviving embers and fuelled with the materials of the twenty-first century" (p. 34). It is not only Indigenous students but all learners who can benefit from the revitalization of Indigenous knowledges.

NOTES

1. Mi'kmaw Kina'matnewey is an organization that supports education in a collective of 11 Mi'kmaw communities in Nova Scotia.
2. Language and terminology are important. The authors have attempted to consider the most appropriate words to use, understanding that words will mean different things depending on the place and time in which they are used. Several terms are commonly used to represent Indigenous peoples. Aboriginal, Indigenous, and First Nations are all terms that appear in the research. In Canada, Aboriginal is a term used by the federal government to describe First Nations, Metis and Inuit peoples. In this paper we have attempted to use the term that suits

the context and intent of a given sentence. We have used the term Indigenous to refer to more general contexts which would include those outside of Canada, and the term Aboriginal in reference to Canadian contexts. Where possible, we have used the names of specific groups such as Mi'kmaq.

3. Throughout this article, Mi'kmaq is used as a noun and can be either singular or plural. Mi'kmaw is used as an adjective. While the rules for creating adjectival forms of words in Mi'kmaq are considerably more complex, it has been agreed by a working group on Mi'kmaw language learning that, when writing in English, these conventions will be used.

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