Drawing upon Mi'kmaw pedagogies

Evan Throop-Robinson, St. Francis Xavier University
Lisa Lunney Borden, St. Francis Xavier University, ✉ lborden@stfx.ca
Ellen Carter, St. Francis Xavier University
Kyla Bernard, Mi'kmaw Kina'matnewey

This paper draws upon conversations with Mi'kmaw (Indigenous) elementary school teachers in a Mi'kmaw controlled school in what we now call Nova Scotia, Canada, as they reflect upon their students' drawings of math class. As part of a larger research project, we invited Mi'kmaw students to draw pictures of themselves doing math, and pictures of themselves in math class. These drawings served as a prompt for their teachers to reflect upon the pedagogical practices revealed in the drawings. The resulting conversations provide an illustration of the pedagogy these teachers enact in their classroom spaces and their tacit beliefs and values about learning. The discussions with these teachers reveal the deeply relational pedagogy that is an integral part of this school community striving to decolonize education.

Introduction

We could never have anticipated the insights offered by classroom teachers during a recent circle conversation in their school, a Mi'kmaw controlled community school in Unama'ki (Cape Breton Island, Nova Scotia, Canada). The teachers were part of a larger research study examining ways to decolonize mathematics teaching and learning through centering Mi'kmaw ways of knowing, being, and doing—L'nuita'simk. We invited them to attend an after-school session to discuss the drawings that their students had made of their mathematics classroom. In one drawing, students were asked to illustrate themselves "doing math" and, in another, to draw "my math class". The students from kindergarten through to grade 4 were given the same drawing tasks. The drawings were intended to make the classroom visible through the children's eyes and to help teachers and researchers see what students find meaningful in learning mathematics. What we did not anticipate was the rich conversation that arose when teachers were asked to comment on the drawings and what level of insight the teachers provided for their teaching and learning. This article describes the unfolding teacher conversation through an enactivist lens where individual and collective knowings co-evolve and emerge simultaneously. Their pedagogical practices revealed in the discussion highlight the ways in which they are working to create a truly Mi'kmaw space for learning.

Please cite as: Throop-Robinson, E., Lunney Borden, L., Carter, E., & Bernard, K. (2021). Drawing upon Mi'kmaw pedagogies. In D. Kollosche (Ed.), *Exploring new ways to connect: Proceedings of the Eleventh International Mathematics Education and Society Conference* (Vol. 3, pp. 1023–1032). Tredition. https://doi.org/10.5281/zenodo.5416838

The MATH project

The conversation circle described in this paper is a piece of a larger research project called Moving Achievement Together Holistically (MATH) that draws upon Lunney Borden's (2010) framework for decolonizing mathematics teaching and learning for Mi'kmaw children. The framework considers elements that can support Mi'kmaw children in mathematics learning through meaningful personal connections that draw from the importance of cultural connections, connecting learning experiences with community values, rooting pedagogical practices in Mi'kmaw ways of learning, and drawing upon the structures of Mi'kmaw language to inform and transform mathematics teaching and learning. The MATH project particularly focuses on implementing pedagogical practices and learning experiences that are rooted in L'nuita'simk that draw from the framework's focus on language and values. Two key guiding principles inform the work: verbing mathematical experiences and rooting experiences in spatial reasoning. In this work we are interested in learning how the implementation of this framework can support Mi'kmaw students' learning and achievement while also attending to their developing identities as Mi'kmaq.

The school we worked in for this aspect of the project, is a Mi'kmaw community run school that is part of the Mi'kmaw Kina'matnewey (MK) collective. In Canada, Indigenous education is a federal responsibility even though all other education falls to provincial authorities. Historically each individual Indigenous community had to negotiate education agreements with the federal government. In 1997, the Mi'kmaw communities in Nova Scotia formed MK as a way to collectively negotiate education agreements, giving jurisdictional control to each community while also having collective shared services to advance the educational interests of all communities (Paul et al., 2017). While MK schools are quite successful with respect to high graduation rates, there is still considerable work to be done to improve mathematics achievement. Our work aims to address an MK identified goal of increasing student achievement and supporting teacher professional learning in the area of numeracy.

Decolonizing education

We make a conscious decision in this paper to not focus on deficit discourses that point to "gaps" for Indigenous children in Canada or the negative impacts of colonial systems of education (Gutiérrez, 2008). We take as shared that these issues exist, that the impacts of colonialism are real and devastating, and that mathematics teaching and learning remain complicit in the colonial project (Nicol et al., 2012; Stavro & Miller, 2017). We choose instead to focus our attention, as we do in our research, on how we can identify and describe healing spaces where Indigenous children can thrive.

We adhere to the idea that asset-based approaches to mathematics education support and affirm children's identity and help them to develop as doers of mathematics (Celedon-Pattichis et al., 2018). Teacher beliefs about children are key in an asset-based classroom where high expectations and cultural affirmation are integral to children's success (Castagno & Brayboy, 2008; Ladson-Billings, 2014).

Battiste (2010), a Mi'kmaw scholar, describes learning from an Indigenous perspective, as a process of nourishing the learning spirit stating:

> What guides our learning (beyond family, community, and Elders) is spirit, our own learning spirits who travel with us and guide us along our earth walk, offering us guidance, inspiration, and quiet unrealized potential to be who we are. In Aboriginal thought, the Spirit enters this earth walk with a purpose for being here and with specific gifts for fulfilling that purpose. In effect, the learning Spirit has a Learning Spirit. It has a hunger and a thirst for learning, and along that path it leads us to discern what is useful for us to know and what is not. Our individual gifts for fulfilling our purpose are expressed in ourselves, in our growing talents, and in our emerging or shifting interests. These gifts often manifest themselves in surprise and in joy. That time of learning has often been called a 'wondrous' time and lasts a lifetime. (Battiste, 2010, p. 15)

Our team

Our team has a long-standing relationship with the school and the teachers in the school, as well as with the children. They are very familiar with seeing us in their school and get excited when we bring fun math activities to work on. Lisa, of settler descent, previously taught within this school and many of the teachers are her former students. Kyla, who is Mi'kmaw, serves as a mathematics coordinator and coach for MK. Ellen, of settler descent, worked as a research assistant and outreach coordinator with Lisa for years before taking a faculty position, allowing her to interact with the teachers and the students for years both within and outside of school. Evan, also a settler, became part of the team when he joined the Faculty of Education at StFX and quickly became connected to the school. All but one of the teachers are Mi'kmaw and from the community. They all completed their Bachelor of Education degree at StFX and several were enrolled in or had recently completed graduate degrees and programs at StFX. The one non-Indigenous teacher had been working in various roles in the school for years. While all four authors were present on the day we collected the drawings, only Ellen and Lisa were available to discuss the drawings with the teachers which they did several months after the drawings had been collected.

Methodology and theoretical framing

For this work we draw upon Indigenous research methodologies (IRMs) integrated with complexity theory as we engage in collaborative meaning making alongside teachers. Indigenous research methodologies are rooted in a desire to decolonize research and honour community voices in a way that challenges typical approaches to research (Smith, 1999). Typically, IRMs focus on the Rs of research, namely notions of respect, relevance, responsibility, and reciprocity (Kirkness & Barnhardt, 1991), as well as reverence and relationality (Archibald, 2008; Kovach, 2009). It is important to recognize that our work is made possible by the deep connections we have to the community and the school, as well as an on-going relationship rooted in reciprocity. Our work in this space is guided by the Mi'kmaw concept mawikinutimatimk (coming together to learn together) that invites all participants to bring

their gifts and knowledge to the circle knowing that we all have things to share and things we can learn from one another (Lunney Borden & Wagner, 2013). We find alignment between our IRMs rooted in mawikinutimatimk and complexity theory.

For the purpose of this paper, we draw upon complexity theory which provides a fitting theoretical framework from which to view this research and, specifically, the teacher conversation that forms the body of data for analysis. Mason (2008) notes that complexity theory "concerns itself with environments, organizations, or systems that are complex in the sense that very large numbers of constituent elements or agents are connected to and interacting with each other in many different ways" (p. 6). Our classroom-based research brings together students, teachers, administrators, and researchers in complex interaction as co-evolving and co-implicated agents, intent on clarifying individual conceptions as much as seeking collective knowledge about what it means to learn mathematics. Complexity theory supports our view that these ways of knowing "take shape simultaneously" (Davis, 1996, p. 5) and problematizes the distinction between teacher and learner as each play an important role in knowledge creation. Davis and Simmt (2003) explain that complexity theory focuses on a range of nested learning systems, which "includes the co-implicated processes of individual sense-making and collective knowledge-generation" (p. 142). This is of particular relevance to this study as we look to children's drawings first, as insights from the individual into what it means to learn mathematics; and subsequently, to teachers' interpretations of these drawings as insights into their classroom and pedagogy.

As Kieren (1995) asserts, our research

> must trace the patterns of mathematical activity and understanding as it occurs, must look at the mechanisms and beliefs by which persons act mathematically, must attempt to account for the ways in which the environment occasions or creates space for personal mathematical activities and must account for the interactions and conversation through which mathematical activity occurs and by which it is bounded.

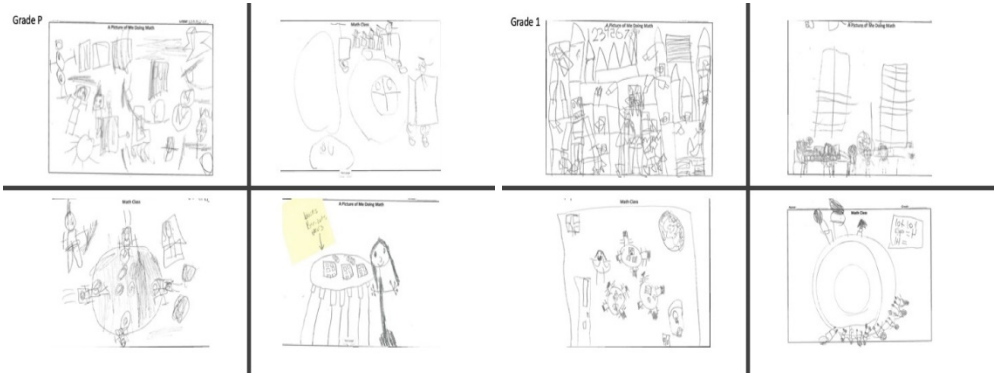

Figure 1: Grades Primary and 1 drawings

Inviting the teachers to join us in the analysis of children's drawings of "My mathematics class" and "Me doing mathematics" through conversation provides insights into the types of

mathematical activity enacted by students and teachers, the environment created by the teacher and within which the students engage in mathematical activity and their classroom interactions. Through this process, we begin to reveal the pedagogical values of the teachers and their shared understanding of what mathematics teaching and learning looks like in their school.

On the day we collected the data analyzed in this paper, Lisa and Ellen had been to the school to work in the classrooms with teachers, a part of the reciprocity of the work. The teachers met with Lisa and Ellen after school to view the drawings as a group and discuss what was seen in the drawings. There were five teachers and the vice-principal (VP) present. We will refer to the teachers as Teacher P who taught grade Primary (Kindergarten), Teacher 1 who taught grade 1, Teacher 2A and Teacher 2B who taught the two grade 2 classes, and Teacher 3 who taught grade 3. Only Teacher 2B is non-Mi'kmaw, all other teachers and the VP were from the community. We spent about 30 minutes reviewing the drawings from the grades P to 3 classes, as teachers commented on what they saw in the drawings. Figures 1 and 2 are selected samples of drawings from the children by grade level. We then invited the teachers to share their ideas about what the collection of drawings revealed for them. In the next section we share some of the teachers' insights.

Figure 2: Grades 2 and 3 drawings

Teacher insights

We noted several themes in what the teachers discussed as they reflected upon the drawings. These included the ways in which their pedagogical choices, in particular the use of learning centres, demonstrated the importance of play and movement, the need to develop students' independence, and the need to honour children's ways of knowing and learning. After we had viewed the drawings we invited teacher reflection. The following transcript is their initial reactions.

The teachers talked about how they made use of learning centres in their math class as a practice that established a clear routine for the children and provided the sort of pedagogical approach that allowed them to support students while building independence.

Lisa: So, we're just wondering what you see in them, or if you notice anything, or if anything stands out to you.
Teacher P: We all do centres.
Lisa: We all do centres, for sure.
Teacher 2B: They seem happy. Like no one seems sad in the pictures.
Lisa: Yeah.
Teacher 1: Busy, when I think they're not learning anything, [giggling] they like it though. I find they learn a lot more at centres than anything. Different ways. They like different stuff; they like to make stuff, the grade ones, different kinds of centres that spark their interest.
Teacher P: Well, AYR very quiet then math is very loud and fun. (laughter)
Lisa: Your class definitely, Teacher P, talked a lot about like, playing with Lego and BeeBots and they didn't actually even understand what we meant by "math." Cause they were just like, like so we had to kind of prompt them, right? Remember like, to think about okay well, what kinds of things do you do when you're learning about numbers or shapes or, and then they got into talking about coding the BeeBots and playing with Lego, but they actually didn't really have a concept of "math"… which is beautiful. (laughter)
Teacher P: They don't think they're doing math, but we are. Like even playing with the, when you saw the tables like partitioning, you see three, you see the two and one. (pause) And there's a lot of movement.
Teacher 2A: Yeah, centres stood out for me.

In this initial conversation of the pedagogical routine of using centres, we see how the teachers regard this as way to learn through play and to allow for choice and different ways of engaging with mathematical concepts. Both Teacher P and Teacher1 share how they want students to learn through playing and through exploring a variety of tasks, without even recognizing that it is mathematics. Later, Teacher 1 asked Lisa if this is something that happens in other schools. When Lisa shared that she often gets resistance from teachers when doing PD because some teachers see this approach as requiring too much work, the teachers seemed surprised that anyone would believe that. Lisa asked what it was about learning centres that they enjoyed as it was clearly a whole school approach that the elementary teachers were employing.

Analysis

In reviewing these pieces of the transcript, we want to highlight some pieces that we believe highlight the pedagogical values we see as we spend time in the school. In particular, we note that teachers have a shared approach to their pedagogy, that they believe in their students and strive to support their learning in diverse ways, that they value play and active engagement in learning, and that they work to make school an extension of home and community that embraces a Mi'kmaw way of being.

A shared pedagogical approach

There is considerable consistency amongst the teachers with respect to what they value when teaching mathematics. The use of learning centres is consistently implemented from the earliest days in school and continued throughout the elementary years (K to 4). We are aware that this vision did not happen by accident, the leadership team at the school made a conscious effort over several years to build the capacity for teachers to work in this way. This involved professional learning opportunities, restructuring physical space, and working collaboratively on this vision. It is clear that the teachers understand this to be their way of working in this school and their efforts are rewarded as they see the benefits to their students. In fact, it is so a part of how they work that they question how anyone could work in any other way.

They do not see planning for this sort of active engagement as a burden, rather they see this as the most beneficial way to engage all learners and provide a variety of experiences to support the many ways in which children might want or need to learn. Often, they talked about how this approach allowed them to work one-on-one with students or in small groups to build conceptual understanding while the other students were engaged in centres that they could do independently.

> Teacher 2B: I like if you're teaching something harder, you don't – like today I was doing regrouping. And there's no way that I could have done that with all of them right? So, I just had the kids at the table I was at. So, all the other ones, may have been doing something they could do I was okay with just focusing on these kids. I can't be over here but, everyone is going to get their turn with me here eventually.

They saw this pedagogical approach to supporting students as a crucial part of their work and believed that doing centres allowed them to effectively support students. At one point, the VP shared an experience from her practicum in another school, where the mentor teacher refused to allow her to do centres, arguing that the students would not be able to do them. Hearing this, the teachers pushed back against this idea, arguing that resistance comes from not having tried this approach, because they believed that if other teachers tried it, they would love it.

> Teacher P: I think just getting up and moving is really good for them. They're not in one spot learning and they learn in so many different ways, right? So, when you do centres, you can touch those different ways of learning, especially the hands on and then.
>
> Teacher 2B: And it's a change, it's not like the same thing all afternoon.
>
> Teacher P: And they know to get up, go to the right direction, the routine, I guess.
>
> Teacher 2A: It's really routine.

Furthermore, Teacher 2B pointed out that "they've been doing it since Kindergarten" and Teacher 2A pointed out that with this approach "the kids are managing themselves," which is rooted in a fundamental belief that their students are competent and can be independent learners.

Believing in students

Throughout the conversation, teachers repeatedly talked about the "different ways" in which students were invited to engage in learning. Over and over again, they came back to this idea and it was evident that they saw this as a way to allow students to find their own strengths through these different types of engagement. In the transcript excerpt provided above, it was acknowledged that the teachers' planning for students included "tapping into all the intelligence and stuff we have" and "you can touch those different ways of learning", built on a belief that all students can learn mathematics demonstrating their high expectations for students. The view of students as competent and independent learners was further exemplified in statements and agreement about students thriving within the centre routines: "they know what to do". As the teachers viewed and made sense of the drawings, they repeatedly highlighted the students' skills and connections, as well as the retention of mathematical content and recollection of activities.

Value of play and active engagement

There is a sense of joyfulness in the ways in which teachers talked about the learning experiences in math, as Teacher P stated, "math is very loud and fun!" The fun they describe often is connected to a belief that math can be learned through play. They expressed the many ways in which they chose to design tasks for centre activities that involved play and offered that students can come to know through play stating "they don't even know they're learning" and "they don't think they're doing math, but we are." This approach evokes Battiste (2010) notion of joy and wonder as key aspects of Indigenous learning. Indeed, the laughter and camaraderie throughout the conversation paralleled the joy teachers strive for in their classrooms as well.

Tied to this sense of wonder and joy is also a respect for children's desire to move and explore the world. As Teacher P stated, "there's a lot of movement" in the drawings, reflecting the importance of movement in the classroom. This again contributes to the joy children experience in the classroom.

L'nuita'simk is home

The sense joy is evident in the faces of children in their own drawings. Teacher 2B noted that everyone looked happy and this is something that we, the authors and many of the teachers took for granted. It was only when it was pointed out to us by others while sharing this work at a research conference that it was made remarkable. Happiness is what we see every day in the school. Happiness, laughter, joy are all a part of what it is to be Mi'kmaw and this school exemplifies this daily. As we analysed this data and engaged in the writing of this paper, Lisa shared a story from earlier in her academic life when she was discussing her recently completed Master's thesis in 2001 with her grade 11 students. She recalled asking "What is it that makes our school different?" to which one student shared, "Miss, it's home!" Decades later, this school is still working every day to create this sense of home for their students. This is a key part of L'nuita'simk.

Concluding thoughts

Through reflecting together on students' drawings, we have drawn out the pedagogy that exists in this Mi'kmaw elementary school. As systems grapple with ways to improve learning outcomes for Indigenous youth, to Indigenize and decolonize classrooms and programs, we see in this example a place to truly be Mi'kmaw. So often, we are asked to talk about what this looks like and the expectations are frequently rooted in stereotypical views of Indigenous Peoples. It need not be that way. By beginning with asset-based beliefs about children and a worldview rooted in community ways of knowing, being and doing – L'nuita'simk - we see that it is possible to transform education for Indigenous children in a way that celebrates who they are and imagines who they might be.

References

Archibald, J. A. (2008). *Indigenous storywork: Educating the heart, mind, body, and spirit.* UBC.

Battiste, M. (2010). Nourishing the learning spirit. *Education Canada, 50*(1), 14–18.

Battiste, M. (2013). *Decolonizing education: Nourishing the learning spirit.* Saskatoon, SK: Purich.

Castagno, A. E., & Brayboy, B. M. J. (2008). Culturally responsive schooling for Indigenous youth: A review of the literature. *Review of Educational Research, 78*(4), 941–993. https://doi.org/10.3102/0034654308323036

Celedón-Pattichis, S., Lunney Borden, L., Pape, S. J., Clements, D. H., Peters, S. A. Males, J. R., Chapman, O., & Leonard, J. (2018). Asset-based approaches to equitable mathematics education research and practice. *Journal for Research in Mathematics Education, 49*(4), 373–389.

Davis, B. (1996). *Teaching mathematics: Toward a sound alternative.* New York: Garland.

Davis, B., & Simmt, E. (2003). Understanding learning systems: Mathematics education and complexity science. *Journal for Research in Mathematics Education, 34*(2), 137–167. https://doi.org/10.2307/30034903

Gutiérrez, R. (2008). A "gap-gazing" fetish in mathematics education? Problematizing research on the achievement gap. *Journal for Research in Mathematics Education, 39*(4), 357–364.

Kieren, T. (1995) *Enactivism and mathematics education.* http://www.acadiau.ca/~dreid/enactivism/EnactivismMathEd.html

Kovach, M. (2009). *Indigenous methodologies.* Toronto, ON: University of Toronto Press.

Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: Aka the remix. *Harvard Educational Review, 84*(1), 74–84.

Lunney Borden, L. (2010). Transforming mathematics education for Mi'kmaw students through mawikinutimatimk [Doctoral dissertation, University of New Brunswick].

Lunney Borden, L., & Wagner, D. (2013). Naming method: "This is it, maybe, but you should talk to...". In R. Jorgensen, P. Sullivan, & P. Grootenboer (Eds.), *Pedagogies to enhance learning for Indigenous students.* Springer.

Mason, M., (2008). Complexity theory and the philosophy of education. *Educational Philosophy and Theory, 40*(1), 4–18.

Nicol, C., Archibald, J. A., & Baker, J. (2013). Designing a model of culturally responsive mathematics education: Place, relationships and storywork. *Mathematics Education Research Journal, 25*(1), 73-89.

Paul, J. J., Lunney Borden, L., Orr, J., Orr, T., & Tompkins, J. (2017). Mi'kmaw Kina'matnewey and Mi'kmaw control over Mi'kmaw education: Using the master's tools to dismantle the master's

house? In E. A. McKinley & L. T. Smith (Eds.), *Handbook of Indigenous education.* New York, NY: Springer.

Smith, L. T. (1999). *Decolonizing methodologies.* London, United Kingdom: Zed Books.

Stavro, & Miller, (2017). Miscalculations: Decolonizing and anti-oppressive discourses in Indigenous mathematics education. *Canadian Journal of Education, 40*(3), 92–122.