

Reggio-Inspired Mathematics: Connecting to Place

by Janice Novakowski on behalf of the educators involved with the *BCAMT Reggio-Inspired Mathematics Collaborative Professional Inquiry Project*.

This cross-district collaborative inquiry project is in its third year, and includes educators from ten districts throughout British Columbia. Educators involved in the project are active on Twitter, using the hashtag #BCAMTreggio, and a collaborative blog is a place to curate ideas, publications, presentations, instructional resources, and a photo gallery. The foundation for the professional inquiry is based on the principles and practices that have been developed in collaboration with educators in the group with expertise and familiarity with the centres in Reggio Emilia, Italy, as well as collaborating with Reggio-inspired schools.

Where does math live here?

As we continue to consider ways to grow and sustain this project, we make connections between these principles and practices and aspects of British Columbia's redesigned curriculum. In considering the core competencies and the *First Peoples Principles of Learning*, as well as specific references to place across many areas of the curriculum, we thought an area we could be responsive to in our professional learning was thinking about place-based pedagogy in mathematics. Inspired by the work of Dr. Cynthia Nicol from the University of British Columbia and David Sobel of Antioch University, we have woven together elements of place-

based and culturally-responsive pedagogies with our developing understanding of Reggio-inspired principles and practices. Many of the districts involved in our project are considering ways to incorporate more outdoor learning experiences, and more than just taking math outdoors, we are looking at how place inspires mathematical thinking and connections.

Lauren McLean and Janice Novakowski initiated a series of informal "institutes" on Saturday mornings to be responsive to educators within our network, but also to open up our work to others who might be interested. We held four of these Saturday institutes starting in the spring of 2017, followed by lunch at a local restaurant to continue the conversation for those who were interested.

Spring Institute 2017: Pacific Spirit Park

On April 22, about 30 educators from across BC joined Lauren and Janice for a walk through the forest, noticing the landscape through a mathematical lens. In the group were educators from Vancouver, West Vancouver, Coquitlam, Burnaby, Richmond, Delta, Surrey, Langley, Chilliwack and Campbell River.

We engaged in several different experiences, uncovering and making connections to mathematics. We began with creating

Reggio-Inspired Principles and Practices

- *the child is capable, competent and has rights*
- *the teacher as researcher-provoker, ball tosser*
- *the child has a hundred or more languages to express ideas*
- *the environment as third teacher*
- *connectedness to culture, community and environment*
- *responsive and emergent curriculum; the uncovering of curriculum*
- *a pedagogy of listening*
- *socially-constructed learning; collaborative practice*
- *inquiry-based; projects and investigations*
- *importance of relationships*
- *focus on big ideas and themes*
- *use of loose parts and natural materials*
- *documentation-making learning visible*

structures using found materials that could be used for a challenge task. These tasks were linked together to create a course that we could run through, timing each other and trying to improve on our times. Participants mapped the course, and considered the spatial reasoning used in mapping—shape, size, distance, proportion, scale and perspective. In another area of the forest, we looked closely for patterns around us. We used field guides to help identify species, and considered the mathematics embedded in plant and animal identification. Throughout the day, there were many interesting discussions about learning outdoors—how it supports engagement, self-regulation, emotional well-being and opportunities for risky play.



Spring Institute 2017: Pacific Spirit Park

Summer Institute 2017: Jericho Beach Park

On June 10, educators from across the Lower Mainland and Campbell River met at Jericho Beach in Vancouver to think about mathematical experiences inspired by the beach environment. As we walked towards the beach together, we each used a “Can you find...?” bookmark to engage us in using mathematical thinking and language together. For example, some of the prompts were:

Can you find a shell that is smaller than the size as your thumbnail?

Can you find a rock that has about half of its surface area covered with barnacles?

Can you find ten pebbles that you can hold in your hand all at once?

Can you find three different types of seaweed?

As educators engaged in these experiences themselves, they made connections to curricular competencies and content connected to the students they were working with.

We were honoured to be joined by Dr. Bridgette Clarkston of the University of British Columbia who is a seaweed expert. We learned about the three main types of seaweed, their life cycles, and their identifying features. As we moved along the beach, we engaged in different provocations, inspired by the setting and supported with some tools brought along such as measuring tapes, sieves, field guides and sand sculpting tools.



Summer Institute 2017: Jericho Beach Park

Fall Institute 2017: Lynn Canyon Park

On November 18, educators from across the Lower Mainland and Fraser Valley met at Lynn Canyon Park. We walked along Lynn Creek together looking at the trees, plants and leaves through a mathematical frame of size, shape and symmetry. We found lichen samples and discussed growth rates of different species making connections to estimation and creating line graphs. We noticed and wondered about the water flow in the creek, and took some time to sketch out a map of the area, considering size, scale, shape and perspective and making connections to our project’s work around spatial reasoning.

After crossing the suspension bridge, we engaged in creating “land art” inspired by Andy Goldsworthy and James Brunt, thinking about pattern, shape, design, balance and symmetry. As we wove our way back to our starting point, we found several mushrooms along the trail and used field guides and apps to identify them considering identifying features such as size, shape and location.

Questions to inspire mathematical thinking when visiting outdoor spaces:

Where does math live here?

What do you notice?

What do you wonder?

What math do you see?

How does this place inspire your mathematical thinking?

Where do you see (patterns, lines, balance) here?

What mathematical story does this place tell?

What math to math connections can you find in this place?

What connections to shape, size and symmetry do we make when we look closely at plants?

What mathematics might we think about as we create a map of this place?

What different ways could we measure the creek? rocks? leaves? twigs? shells? cones?

How can mathematics help us to understand this place?

Participants were each provided with a provocation card listing several questions to provoke their thinking about place-based mathematics. Many of these questions are general and can be asked across a variety of contexts. Some examples of the questions are provided above.



Fall Institute 2017: Lynn Canyon Park

Winter Institute 2018: Cypress Mountain

On February 17, educators from across the Lower Mainland met at Cypress Nordic Park to go snowshoeing and consider what might inspire our mathematical thinking and questions. We began our snowshoeing adventure by considering the questions: *What math*

do we see? What math lives here? What mathematics is involved in snowshoeing? How does snow provide a context for thinking about mathematics?

It had snowed overnight and was continuing to snow as we snowshoed, giving us the opportunity to look closely at the texture and undulation of the accumulated snow. We considered the conditions that affected how snow formations were created, and Lauren shared her understanding of local indigenous knowledge about how snow accumulations and texture can be used for both locating and tracking. Related questions that were raised by educators included: *How do you measure the amount of snow falling? What is the relationship between temperature outside and the size of snowflakes? How do you measure the density and depth of snow on the ground? How does this affect how we move in the snow?*

Along the snowshoe trails were several interpretive signs about the region, its animals and trees. Many of the signs provided mathematical information to provoke our thinking, such as how tall some trees grew, leading to the estimation of what percentage of the tree was visible above the snow, as well as information about the territorial range of animals.

As we snowshoed and then had lunch together, we shared different mathematical investigations we could try with our students when it snowed, such as measuring snowfall using graduated cylinders and metre sticks, collecting snow and estimating and measuring how long it takes to melt using

different external temperatures, creating shapes and tracks in the snow, building 3D shapes with snow, creating tracks and trails in the snow and then creating maps of these, and also using field guides to identify trees and animal tracks (which could be included in our maps).



Winter Institute 2018: Cypress Mountain

The Saturday institutes were documented with photographs, observations and notes about the connections and questions that emerged along the way. So far, two e-books have been compiled, which can be accessed by educators unable to join in with our explorations:

Where Does Math Live in the Forest?

<https://goo.gl/Mbe3y2>

Where Does Math Live at the Beach?

<https://goo.gl/iDUQfj>

For more information, follow #BCAMTreggio or @jnovakowski38 on Twitter, or check out our blog (Reggio-Inspired Mathematics), or “Reggio-Inspired Mathematical Provocations” in the Fall 2014 Elementary Issue of Vector, Vol 2014, issue 2 (<http://www.bcamt.ca/communication/vector/past-issues/>).

Excerpts in this article were drawn from our project’s Reggio-Inspired Mathematics blog posts found here: http://janicenovkam.typepad.com/reggioinspired_mathematic/

