

## Fraser Valley Mathematics Sq'ep: report

Fraser Valley Mathematics Sq'ep took place February 29th at UFV Abbotsford campus. This second annual edition of the event, organized by faculty from the University of the Fraser Valley and local district representatives, brings together a community of mathematics educators through the sharing of ideas, examples, resources, teaching practices and research activities that weave Indigenous knowledge and world views of knowing and connecting with mathematical learning.

This year's theme was "Mathematical Artforms and Indigenous Culture". Our lineup of speakers included a keynote by Mohawk mathematician Ed Doolittle as well as 6 workshops led by people with experience at various levels of education, from elementary to post-secondary. The structure of the gathering is unique in that we begin the day with a plenary, while the latter half consists of smaller breakout groups focusing on a particular connection between mathematics and Indigenous culture. Workshops provide a hands-on experience with materials and resources for participants to take away with them. Please find keynote and workshop abstracts at the end of the document.

We had over 100 participants, 75 of which pre-registered for the event. Each registered participant received a resource package, which included posters, samples of lesson plans, information about available online resources and (in the case of early bird registrants) a book of their chosen grade level.

We worked closely with Indigenous community and produced a numeracy booklet in Halq'emeylem language. Hard copy of the booklet was shared with all of our participants. The extended and updated version is now available on our website:

<https://www.ufv.ca/math/fraser-valley-mathematics-education-sqep/>

Here is the summary of the participants feedback:

1. **Keynote was fantastic/awesome/fabulous/great:**
  - Very cool demo; learn lots about connections between mathematics and music.
2. **Workshop leaders with diverse background were interesting, fun, and very involved.**
3. **Workshops were well presented, informative, interesting and relevant:**
  - *Presenters were great, approachable and warm; very personal and inspirational.*
  - *Provided variety of interesting and relevant topics to choose from.*
  - *Offered different perceptions of maths and indigenous practices in schools.*
  - *Sessions had good lengths, allowing deep explorations and interactions.*
  - *Offered provocative and practical ideas with hands-on participation in activities (inside and outside).*
  - *Allowed opportunities to ask questions, collaborate and exchange ideas.*
  - *Mixing of different levels was fun, good change of pace, with chances of interacting with other teachers.*
4. **Discussion of authentic ways mathematics are present in land and nature, and making connections between indigenous knowledge and knowing and mathematics.**
5. **Argued the need to re-think how 'connections' are presented, and ways of respecting the environment (land/nature).**
6. **Making connection through cross-curricular lessons, like maths and arts and others such as social issues.**
7. **Shared many lessons' ideas and problem-based learning that were applicable, tried and ready to be implemented in classroom and to teaching practice immediately.**
8. **Availability, access and exposure to relevant and practical books, resource materials and online info.**
  - *Number Book was an amazing gift!*
9. **Very relaxed environment, meeting new people, renewing acquaintances, and everyone enthusiastic.**
  - *Learning about local indigenous people and maths in everyday life.*
  - *Good synergy.*
10. **Great team and organisation throughout (except the sign-up and closing).**
  - *Welcoming, approachable and warm.*
  - *Great theme – integrating math with non-traditional applications.*

## Day Schedule.

8:30 - 9:00	Registration and Breakfast
9:00 - 9:30	Opening remarks
9:30 - 10:20	Keynote Speaker: Ed Doolittle
10:20 - 10:45	Morning Break and Working Groups Sessions Sign up
10:45 - 12:00	Working Groups Morning Sessions
12:00 - 12:45	Lunch break
12:45 - 14:00	Working Group Afternoon Sessions
14:00 - 14:15	Coffee break
14:15 - 14:30	Wrap-Up Discussions, Closing Ceremony and Door Prizes

## Session titles and abstracts

### Edward Doolittle: “Indigenous Music and Mathematics” (keynote)

Mathematics has been applied to the study of music for thousands of years. In this presentation, Edward Doolittle will be applying mathematical ideas and techniques to the study of Indigenous music using live demonstrations with computers and readily-available software. We will explore representations of rhythms and waveforms, and techniques like noise cancellation, resonance, and the Fourier transform to understand, alter, and produce music.

Edward Doolittle is Mohawk from Six Nations in southern Ontario and an Associate Professor of Mathematics at First Nations University of Canada in Regina, Saskatchewan. He earned his PhD in pure mathematics at the University of Toronto, where he studied partial differential equations, the branch of mathematics most closely associated with music.

### Fok-Shuen Leung: “With loss of generality: Abstract mathematics and grounded applications”

This workshop derives from insights gained in an introductory Mathematics course recently given for Indigenous elementary education students at the University of British Columbia. In particular, mathematics - at least as we commonly teach it in Canadian universities - has a tendency towards the abstract, while learning - particularly Indigenous learning - favours grounded, contextual approaches. Is there a right balance?

Attendees will participate in a lesson from the course before analyzing it together and extending their conclusions to their own teaching. Please dress for the weather, as some portion of the workshop will take place outside.

### Veselin Jungic: “What has Small Number been up to?”

Small Number is a young Indigenous boy who has an impressive aptitude for mathematics – and also a proclivity for getting into trouble. In this workshop we will join Small Number in several of his adventures: We will count tipis, learn how to avoid double counting, check what happens when Perfect Number joins her brother’s basketball team, do calculus for Kindergarten, and try to catch a very smart rabbit.

### Kori Czuy: “(re)connecting with the land”

When was the last time you truly connected to the land? ...smelled the cedar, felt the soil between your toes, embarked on developing a relationship between the tall grasses by connecting with the subtle direction of the wind that moves the strands or connecting the location of the sun with the resulting shadows... Our place alongside Earth Mother is often described as on or over, creating a power dynamic of hierarchy

and control, and through this process of dominance over the land, lost was our connection with her. Our ancestors understood the value of these connections and relationships, and passed on this knowledge through stories of direction, location, and measurement. Map-making was a way to navigate Earth Mother, create relationships between spirits and beings and places, predict cycles of change and chaos in order to thrive within the circle of relations, all relations. This workshop will reengage our relationship with the land by map-making through non-standard, natural materials, and through all our senses.

Christine Ho Youngusband: “Embedding Mathematics into Indigenous Worldviews and Ways”

This session is focused on designing secondary mathematics learning activities that focuses on the First Peoples Principles of Learning and local Indigenous knowledge. Christine will share her pedagogical experiences as a non-Indigenous math educator, curriculum developer, and teacher educator how she approached embedding mathematics into Indigenous worldviews and ways that integrates local Indigenous culture and mathematics. “Learning takes patience and time.” The planning process takes a reversed approach to planning by putting culture and context first before the mathematics. Christine has been learning from peers of Canadian Indigenous heritage, from professional learning opportunities to collaborate and develop learning activities that incorporate Indigenous content and curricular competencies, and embeds Indigenous learning experiences into her teaching practice to be more inclusive, develop numeracy, and deepen one’s understanding of First Peoples Principles of Learning. In this workshop you will consider strategies on how you can embed mathematics into local Indigenous context and content.

Cynthia Nicol: “Listening to the Land for Mathematical Inspirations:  
Braiding art, storywork, and land-thinking as relational approaches for mathematics teaching”

This workshop explores how place/land can ground our relationships with each other, mathematics, and communities at local and global levels. We’ll consider how listening to land provides opportunities for mathematical engagement and relational ways of thinking/being. Together we’ll explore activities with potential to support students’ mathematical understanding of large numbers, patterning, transformations, measurement, volume, area, and proportional reasoning. We’ll also examine various frameworks to guide our lesson development and together share ideas and questions towards braiding future mathematical adventures.

Janice Novakowski: “Connecting Mathematics to Community, Culture and Place:  
Susan Point’s Spindle Whorl Art Explorations”

During this session, a math studio project with grades 3 and 4 students will be shared as one way to learn about cultural practices while uncovering mathematics in the process. Working group participants will engage in material-based explorations of spindle whorl design by considering shapes, symmetry, quantity, symbols and stories.