It is with great pleasure and pride to speak to you as a member of the University of Fraser Valley in Abbotsford, British Columbia, Canada, whose campuses are located in the traditional unceded Territory of the Stó:lō Nation, or known as the “River People”. 

CIRCLE C SHARING:

• My experience with the 'Beadwork + Mathwork Community Project' (2021-2022)

• Objective: Learning to bead together and explore mathematical ideas, patterns, and connections to Indigenous perspectives.
Community Beading

- **Project:** We engaged in beadwork and mathwork (over 5 sessions) while contributing to a larger social action collective project – the community “hyper-blanket” (Artist’s sample below).

Community Beading

- **Materials, plus more:**

Sessions 2-4: From Triangles to Hyper-Squares

Beadwork + Stories + Mathwork

1. What/who inspired you – how did you get started?
2. What are you trying to do?
3. What are you learning?
4. What’s next?
Triangular Layout of the Beads: https://beadographer.com/app/
Triangle below is 15 "long" on the spine
One Exemplar Question: How many beads (are needed) in total?

APPLICATIONS:
Think about this structure as that of:
• roof tiles of a building.
• seating arrangement in an auditorium.

Beadwork + Mathwork

Beadwork + Stories + Mathwork
1. What/who inspired you – how did you get started?
2. What are you trying to do?
3. What are you learning?
4. What’s next?

Layout of the Beads and Ways of Counting the Total of each Third

Beadwork + Mathwork

“Spiral” Layout

Formulas for the Sum of an Arithmetic Sequence: 
\[ S_n = \frac{n}{2}(a_1 + a_n) \]
where
- \( a_1 \) is the first term
- \( a_n \) is the “last” term
- \( n \) is the number of terms
- \( d \) is the common difference

TOTAL

\[
\begin{align*}
1 & + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 16 + 14 + 12 + 10 + 8 + 6 + 4 \\
& = 1 + 3 + 4 + 5 + 7 + 9 + 10 + 11 + 12 + 13 + 14 + 15 + 16 - 2 \\
& = \frac{16(16 + 1)}{2} - 2 \\
& = 8(17) - 2 \\
& = 136 - 2 \\
& = 134
\end{align*}
\]
**Beadwork + Mathwork**

• Vertical/Column Layout

\[
\text{Formula for the Sum of an Arithmetic Sequence: } S_n = \frac{n}{2}[2a + (n-1)d]
\]

<table>
<thead>
<tr>
<th>The sum of the first n terms is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a + (a+d) + (a+2d) + \cdots + (a+(n-1)d) = \frac{n}{2}[2a + (n-1)d] )</td>
</tr>
</tbody>
</table>

\[
\text{TOTAL: } 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20
\]

- \( \frac{10}{2}[2(2) + 9(2)] = 100 
- 100
- 10
- 110
- 130

10

**Beadwork + Mathwork**

• “Spinal” Layout

\[
\text{Formula for the Sum of an Arithmetic Sequence: } S_n = \frac{n}{2}[2a + (n-1)d]
\]

<table>
<thead>
<tr>
<th>The sum of the first n terms is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a + (a+d) + (a+2d) + \cdots + (a+(n-1)d) = \frac{n}{2}[2a + (n-1)d] )</td>
</tr>
</tbody>
</table>

\[
\text{TOTAL: } 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19
\]

- \( \frac{10}{2}[2(1) + 9(2)] = 100 
- 110
- 110
- 130

11

**Beadwork + Advanced Mathwork**

**MATHEMATICAL NOTICING:** Graphing a warped hyper square on Desmos

“My daughter was so fascinated by the warped hyper square. She challenged herself to graph it on Desmos.”

A Community Member’s Sharing
Beadwork + Stories + Mathwork: All ARE Relational

1. What/who inspired you – how did you get started?
2. What are you trying to do?
3. What are you learning?
4. What’s next?

Volcanic Eruption and Tsunami in Tonga: Jan 15, 2022

Challenge:
How can I bead circular rings within a hyper-square to tell the story of this explosion?
SURPRISE: A single hyper-square tells more than one aspect of the story!

Beadwork + App + Mathwork = Story

App: https://beadographer.com/

Add colours Beadographer

Tonga Volcano Eruption

The “Sonic Boom” that travelled around the globe!
Twin Volcano Islands: One Part of the Story.

Ash-Clouds: Another Part of the Story

Tsunami Waves: One More Part of the Story
Beadwork + Mathwork = More Excitement

Note: The additional colours of green and orange represent the Community and Reconciliation.

Beadwork + Stories + Mathwork = Explorations
1. What/who inspired you – how did you get started?
2. What are you trying to do?
3. What are you learning?
4. What’s next?

Tongan Kupesi (Traditional Designs)

Beadographer + Design = Hyper-Square

“Tokelau Feletoa”

[A Tongan “kupesi” (traditional design): has its own story, significance, and value.]
“Tokelau Feletoa”
[A Tongan “kupesi” (traditional design): has its own story, significance, and value.]

“Amoamo Kofe”
[A Tongan “kupesi” (traditional design): has its own story, significance, and value.]

“Manulua”
[A Tongan “kupesi” (traditional design): has its own story, significance, and value.]
Pattern of the “Spiral” Beading Process

Patterns in the First Five Spirals:
Spiral 1: 1 + 1 + 1 + 1
Spiral 2: 2 + 2 + 2 + 2
Spiral 3: 2 + 1 + 2 + 1 + 2 + 1 + 2 + 1
Spiral 4: 2 + 1 + 2 + 1 + 2 + 1 + 2 + 1 + 2 + 1 + 2 + 1
Spiral 5: 2 + 1 + 1 + 2 + 1 + 1 + 2 + 1 + 1 + 2 + 1 + 1 + 2 + 1 + 1

THE NEW FRONTIER
Why the interest in exploring the Tongan traditional designs with beads?

TONGAN KUPESI (TRADITIONAL DESIGNS)
MANUFEA FATA NO TUTONGA AMORAMO KOPE

Inspired by my mom (far right, with two of her sisters) who used to be a traditional Tongan tapa art-designer!

Tapa-Making and the Art of Traditional Designs

“Tokelau Feletoa”
My Mom’s Traditional Tongan Tapa Designs at St John’s College, UBC.

My Mom’s Traditional Tongan Tapa at Special Family Occasions.

I can’t wait to bead some more....

Malo ‘Aupito – Thank you Very Much!