

**UNIVERSITY OF THE FRASER VALLEY**

**Stan Manu**

**NITEP Students as Educators - What I learned from Sharing MFEE in Bella Coola.**

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**Territory Acknowledgement**



Sumas Prairie in Abbotsford with Mt. Baker in the background. Photo is from before the flood of 2021.



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". [Photos © UFV]



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**Nuxalk College, Bella Coola (Fall 2018)**



Bella Coola. (Michael Wigle photo)

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**Bella Coola & Hagensborg, the Norwegian Settlement in the Valley**



SOURCE: <https://www.bellacoolamuseum.ca/en/maps.php>

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**From UFV to Nuxálk College**

- Cohort of (13) indigenous students at Nuxálk College
- Undertook UBC's NITEP Program (Indigenous TEP)
- Nuxálk College oversaw the electives; NITEP ran the Core
- Bella Coola hosted as the **Field Centre**.
- Fall 2018, Nuxálk College partnered with UFV to bring both **Math 105** and **English 105** for students in NITEP program.
  - **English 105: Academic Writing**
  - **Math 105: Mathematics for Elementary School Teachers**

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**NITEP Field Centre: Bella Coola**

**Field Centres** SOURCE: <https://nitep.educ.ubc.ca/field-centres/>

NITEP is unique in that applicants who qualify complete the first two years of study at field centres around the province or at an urban focus centre on campus in Vancouver.

In the field centres, students complete post-secondary arts and science courses that relate to elementary or secondary school subjects, education courses, and education field placements. After completing their work at the field centres, students transfer to the UBC Vancouver campus to complete the remaining one or more years of their degree requirements.

The locations of NITEP field centres are agreed upon jointly by the representatives of the First Nations Communities, universities, colleges, UBC and cooperating school districts. Presently, field centres are located in Bella Coola, Cariboo, and on the UBC Vancouver campus. Field centre locations are subject to change.

**UBC Vancouver**



**Cariboo - Now Closed**



**Bella Coola**



**Okanagan**



**Northern Field (Gitw'angak)**



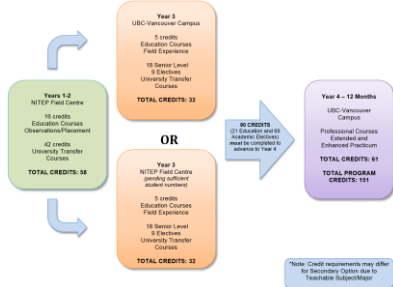
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## Overview of UBC's NITEP Program



### NITEP OVERVIEW

SOURCE: <https://nitep.educ.ubc.ca/students/>



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## From Metro Vancouver to Bella Coola Valley



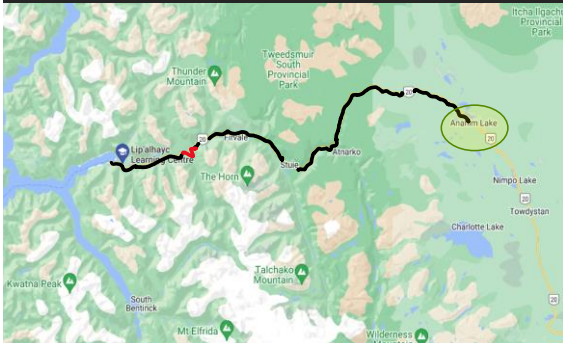
SOURCE: <https://www.bellacoolamuseum.ca/en/maps.php>

© Stan Manu

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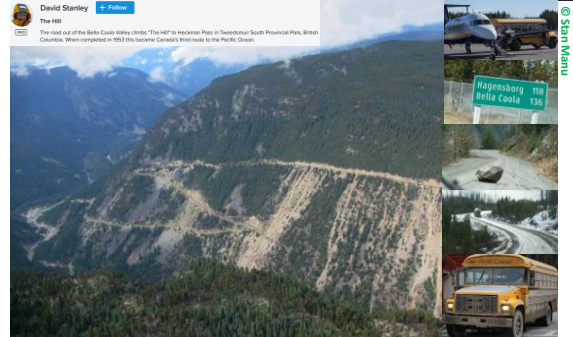
© Google Map

## "The School Bus Transport from Anahim Lake to Bella Coola"



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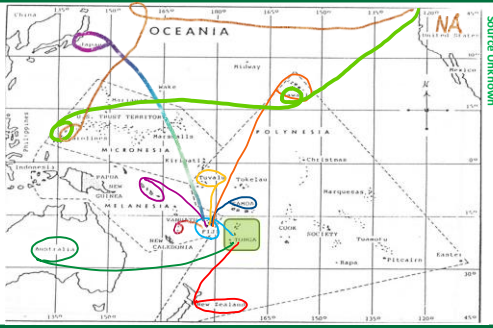
## "The Hill"



© Stan Manu

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## Why did I jump at the opportunity?



Source Unknown

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## Week 1 Temporary Classroom



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## Weeks 2-3 Classroom



## Every new day starts with a 'prayer' circle

"Within the SACRED CIRCLE, we are encouraged to speak not only from the MIND, but from the HEART."

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Am I a "trailblazer" – the first Tongan to make "contact" with the Nuxalk Nation people?

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The first "contact" with the Nuxalk Nation people happened in Aotearoa, New Zealand.

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Final Exam	35%
Major Research Project	15%
Assignments (3)	25%
Class Activities: Individuals or Pairings	5%
Group Activities & Poster Presentations	20%

Duration	Day	Topics	TEXT
Weekend 1 Oct 19 – 21	Friday	✓ Problem Solving: Process & Strategies	Chapter 1
	Saturday	✓ Additional Problem Solving Strategies. ✓ Whole Numbers and Numeration and Hindu-Arabic System. ✓ Whole Numbers: Operations & Written Algorithms.	Chapter 1 Chapter 2
	Sunday	✓ Whole Number Computation: Mental, Estimations & Algorithms in other Bases.	Chapter 3 Chapter 4
Weekend 2 Nov 2 – 4	Friday	✓ Number Theory & Tests for Divisibility	Chapter 5
	Saturday	✓ Fractions: Rational Set and Operations ✓ Decimals, Ratio, Proportion & Percent	Chapter 6 Chapter 7
	Sunday	✓ Optional Topics/Chapters/Sections	X
Weekend 3 Nov 16 – 18	Friday	✓ Geometric Shapes and Properties	Chapter 12
	Saturday	✓ Geometric Shapes and Properties ✓ Geometry using Transformation – Symmetry and Tessellations	Chapter 12 Chapter 16
	Sunday	✓ Optional Topics/Chapters/Sections	X

Additional Topics: Chapter 8: Integers – Operations, Properties & Order  
Chapter 13: Measurement (Perimeter, Area & Volume)  
(Class picked 2 other topics)

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Bears  
Have been Spotted in the  
Downtown  
Area!!  
... BE BEAR AWARE!!  
Please put your OUTSIDE LIGHTS ON  
In the Evenings!  
Thank You!

Relevance of Classroom Activities

The Valley is home to wild bears and so class activities and some discussions often revolved around bears

The Power of Group Work: A Community of Learners

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Relevant Activities

### Enlarging a Poster

Photograph: 10cm x 10cm  
Poster: 20cm x 20cm

[Source Unknown]

### Salmon Problems

**P1** Three baskets of salmon are delivered to a village patch. Each basket contains four Coho and three Pink salmon. How many salmon are delivered altogether?

**P2** Six baskets of salmon are delivered to a family patch. Each basket contains three Coho and three Pink salmon. How many salmon are delivered altogether?

**P3** Six people are each given two thirds of a whole salmon fillet to eat home. How many whole fillets are they given altogether?

**P4** There are twelve salmon in total. One third are Coho. How many are Coho?

**P5** I am given one sixth of a whole salmon fillet. I eat only one half of one slice. What fraction of the whole fillet do I eat?

**P6** At the BC Inn Restaurant, each person is given one third of a whole salmon fillet. I eat one fourth of one slice. What fraction of the whole fillet do I eat?

### Science and Math using Cedar

- building a canoe,
- weaving hats,
- clothing,
- making rope,
- building plank houses,
- carving a pole,
- making baskets.

### Counting Systems in Haly'emeylen

- General counting, counting people, counting money, and time;
- Different ways of conceptualizing counting reflect different world views.

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## Poster Presentations & Group Activities

### The Student's Research Project

MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS RESEARCH PROJECT FALL 2018

This research project is worth a total of 15% of your final grade. There are two equally weighted components: a short summary/analytical/reflection paper **and** a poster presentation. **Due: 11:59 AM, Friday November 16, 2018**

**Introduction**  
We learn mathematics by using Hindu-Arabic number system. This system dates back to India sometime between 700-500 B.C. However, this numeral system did not become widespread until 1200 A.D. when the mathematician Leonardo of Pisa (Fibonacci) promoted it in his book Liber Abaci (Book of Calculation). We learned a bit about the Mayans, the Babylonians, and that other civilizations had developed their own way of dealing with number representation, counting and calculations, and they range from simple to more complex.

**Goal of this Research Project**  
The goal of this research project is to conduct a short investigation about any indigenous numeral or counting system either within your own community or the Nuxalk Nation at large, or within the Northwest. You then use the information gathered to write a summary or analytical report of your findings plus create a poster presentation to showcase your research. This project would demonstrate your knowledge of numbers and its representations – oral language, symbolic, or other forms – particularly in a practical setting within the Northwest region.

**Here are a few practical examples\* of research questions you could ask or consider to analyse for this project:**  
Was age marked by a number? Were weaving patterns or drumming beats associated with numbers? How was trade done? If longhouses were built - how were things measured for building? What about totems? When was money introduced to the Nuxalk? Did money change the counting vocabulary...how? Or did it become English only?

**Scope of the Research Project**  
Your investigation should address at least some of the following:

- Describe the number system.
  - Which or did the numbers in your number system. (Are they represented symbolically and/or orally? If symbols are used, what types and do they have specific meanings? Are there symbolic patterns, and describe any equivalence with our Hindu-Arabic numerals.)
  - Describe how to perform the basic operations. (Focus on addition and subtraction but do share any multiplication/division links, if any.)
- Provide additional information about your system.
  - When was the number system developed? Where? (Describe the geographical region.)
  - How long was it used? How far does it date back (approximate)? Is it still used today; if not, when approximately did its usage end?
  - Why was the number system developed? What benefits did it hold for your community or nation?
  - What types of functions was the number system used for?
  - Describe any other interesting facts or things about the overall civilization (history, culture, climate, noteworthy accomplishments) and the role the numeral or counting system plays or played in it.

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The University of Fraser Valley is in Abbotsford, British Columbia, Canada, whose campuses are situated in the traditional unceded Territory of the Stó:lō Nation – the River People.

### Research Project: GOAL

- The goal of the research project was to conduct a short investigation about any indigenous numeral or counting system either within your own community or the Nuxalk Nation at large, or analyse a published research on pre-colonial numeracy and counting in another nearby community in BC or within the Northwest.

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### Research Project: Objective

- The project was aimed at demonstrating the students' knowledge of numbers and its various representations – oral language, symbolic, or other forms – particularly within a practical setting in the Northwest region.

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### Research Project: PRACTICAL EXAMPLES

- Was age marked by a number? Were weaving patterns or drumming beats associated with numbers? How was trade done? If longhouses were built - how were things measured for building? What about totems? When was money introduced to the Nuxalk? Did money change the counting vocabulary...how? Or did it become English only?

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## Research Project: Expectations & OUTCOMES



### Outcome 1: Summary/Analytical/Reflection Paper [7.5% of your final grade]

After conducting your research and learning about your own or a nearby community's indigenous numeral or counting system, you will then prepare a summary/analytical/reflection paper of your findings with the following:

- A description of your research project as well as its learning objectives.
- A summary of the research you studied or an analysis of a published research on number/counting system.
- A self-reflection on your learning experiences during this project and how it relates to our discussion of other pre-colonial numeral systems in our course.

The summary/reflection paper should be 3-5 pages long, typed, double-spaced, 12 pt. standard font, with standard margins. Grammar and spelling count! Extra credit will be rewarded for going above and beyond.

The Summary/Analytical/Reflection paper will be evaluated out of a total score of 25 points, as follows: Title (1 pt), Introduction (2 pts), Main Content – Summary of the Research (15 pts), Conclusion (2 pts), Personal Reflection (3 pts), and Overall Clarity of Writing (2 pts), and bonus points for any references.

### Outcome 2: Poster Presentation [7.5% of your final grade]

The key to a successful presentation is organization. Use the 25-point grading rubric below to guide you in how you plan your poster. A 24" x 36" size chart for the poster will be available for you, if needed, in our next class.

## Students' Poster Presentations



1 POSTER: Nuxalk Numbers

5 POSTER: Potlatching and Numeracy

2 POSTER: Nuxalk River/Spoon Canoe

6 POSTER: Nuxalk Family and Canning Salmon for the Winter

3 POSTER: Copper for Nuxalk People of Bella Coola

7 POSTER: Heiltsuk 'Haitzaq' Numeral System

4 POSTER: Nuxalk's "Credit" System

8 POSTER: Gitksan Grease Trail

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### Poster 1: Totem Poles' "Credit" System



A Chief is trained in all aspects that are involved in the role, and hosting potlatches for all to witness and building "credit" with other nations. A Chief usually hosts a potlatch every 4 year and keeps a records of every potlatch attended using a Totem Pole. Each Totem Pole (one for "Debt", second for "Payment", and a third for "Credit") is marked with details associated with each, carved top to bottom (e.g. "House of the Sun", "Copper" or "Killer Whale" chief for Debt, Payment, and Credit:

- When a witness receives a gift, which is taken home along with acquired knowledge and shared with the community, s/he indebted to that Chief.
- Hosting a potlatch is a way to pay back the debt. When preparing the giveaways, one needs to know how much is owed, and then matched the amount that was received. The Pole is used to keep records for when one is ready to host own potlatch. The "Credit" pole is for keeping record of "gained credit", the extra giveaways that would again build one's credit and others' debts.

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### Poster 3: Nuxalk's Uses of Cedar



Nuxalk Nation people are part of the Pacific Northwest Coast Salish People, who are recognized as master weavers of cedar and its uses. This project explores numeracy in the uses of two types of cedar, yellow and red:

#### Cedar Uses:

- Masks (shredded cedar fiber)
- Weaving (hats, clothing, mats & blankets)
- Totem poles
- Houses
- Canoes

#### Harvesting:

- Daily use and ceremonial purpose
- Must ensure survival of the tree as a species
- Men must say a prayer before cutting down a tree
- Harvesting cedar park is done by women
- Parts: roots, bark, wood, and sub-branches of tree

Origin of Cedar: [www.indigenousfoundations.arts.ubc.ca](http://www.indigenousfoundations.arts.ubc.ca) or "Tree of Life": [www.coastsalishjourney.com](http://www.coastsalishjourney.com)

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### Poster 2: Nuxalkmc Sat'l'a (Canoes)



Different designs and mathematics involved in the construction of different types of canoes:

(1) **War Canoes:** Function is to hold people, hunting supplies, storage for weapons, and different design to accommodate the ocean waves and paddles.

(2) **Transport Canoes:** Designed for harvesting wood, animal carcasses (food), medicine and canoe poles/paddles.

(3) **River Fishing Canoes:** for *sputc* (Ooligans), salmon, net and net poles.

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### Poster 4: Numbers and Measurements



Student found that the *Nuxalk* form of counting system was not as "advanced or as intricate" as other forms of number systems (like Babylonian and Mayan). But acknowledged own people's way of keeping track of things based on *moon phases* as a way of measurement (e.g. for harvesting different species of salmon or different plants) and *time of year* (e.g. *times of ceremony, life span, and measurement of wealth using potlatches*) including the significance of the "number four" (four seasons, four directions, etc.). Food count was also significant for determining supply and distribution.

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## Poster 5: Heiltsuk Numeral System



Student shared a *Heiltsuk* First Nation's Numbers and Quantities (e.g. 1 as "m̓n̓úkv" and 11 as "m̓niyagiu").

Also presented example of *Chinook* Trade Language, shared a history of Heiltsuk First Nation and traditional homelands.

**SOURCE:** *UVic Hakai Institute Magazine: Coastal Science and Societies.*

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## Poster 6: "Value of Four"



Student explored numeracy and shared the 'Creation Story', which derived from the "Four Treasures": *Tcamathlh*, *Kw'alhtnta*, *Smauyusta*, and *Klhalkta*. Also mentioned the *four* carpenters, *four* thunderbirds, *four* days of fasting, and *four* potlatches to get chieftenship.

"Four Wheel" [Source: Unknown]



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## Poster 7: Nuxalk Numbers



Student discussed how Nuxalk people kept track of things using "celestial references in the heavens, and seasons and lunar cycles to keep longer time", and historical events were tracked by "counting back through generals". After contact, the villagers were taught counting words as follows:

"smaw" (1), Lhnus (2), "asmus" (3), "mus" (4), "T'sicw" (5), "T'xulh" (6), "nusfalkhlm" (7), "k'ilhnus" (8), "k'ismaw" (9) and "Is'klakt" (10).

Other events or practices that involved numbers:

- 1) Metronome: drums were used to keep time while warriors paddled the canoes;
- 2) Money: trading system
- 3) Time: days were counted by suns and months by moons; years by winters and beyond that.

**EXAMPLES:** "Before the sun rises" (4am), "When the wind begins to blow" (4pm);

or "When the sun is high" (midday);

"We'll meet in three suns" (3 days)

"She has been gone many moons" (many months)

"The Chief has seen many winters." (many years)

"Long ago in the time of the long winter" (hundreds of years)

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## Poster 8: Coppers as Currency



Student described how coppers are used as a type of "banking system". They are purchased or obtained through trade with settlers. The size does not determine the value or is dependent on the actual trading or purchased price but on the amount of work that is put onto the copper during ceremonies. To increase the value of a copper, several things are done:

- (1) Painting by a commissioned artist with ancestral designs;
- (2) Giving it a name which must be validated by giving gifts to witnesses;
- (3) Making gifts first by validating the copper, retelling the history of the copper (design and origin), passing the copper from one *staltmc* to another.

When copper has substantial value, it may be used for a purpose such as marriage whose ceremony showed the trading of hunting, fishing and gathering rights. The amount of gifts, the food provided for the feast, and goods distributed, were placed on the coppers of both families, thus increasing the value. Copper is also used in the "breaking ceremony" for political and spiritual purpose to challenge and shift power but it hasn't been performed the last 100 years.

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## Poster 9: Salmon for Winter/Year



A mother of a family of three detailed in her poster what is involved in the canning of salmon and preparation for winter season. Her poster outlined the following information:

1 jar = 500mL

1 case = 500mL jar x 12, which requires approx. 4 sockeye or 2 coho salmons

Family uses 1 jar/week (2 adults), 4 jars/month;

Equivalent to 24 jars/year, and thus the amount of salmon needed for a year = 4 coho or 8 sockeye

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## Poster 10: Grease Trails



The student's Grease Trails poster maps out the trading routes of the Nuxalk Nation people from Bella Coola to Anahim, and to Quesnel and Nazko. Items traded include fried fish, fur hides, meats (venison), beans, and Oolichan. Many of these tradings were done without money but rather in terms of their values to different nations.

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Poster 11: Gitksan, 'The River of Mists People' UNIVERSITY OF THE FRASER VALLEY

A Gitksan student outlined the history of the people from "The River of Mists", their territory, the Salmon basis for a subsistence economy, and grease trails used for trading and bartering. Gitksan number words were shared: "hilt" (many), "hlibuu" (a few), "sdo'" (half), "hlagats'oo" (some/others), "bxaa'nitxws" (allot/whole of), "gwalk'a (all), and "ky'ul" (every).

Some Gitksan seasonal terms associated with time were also shared:

- "Lasa hu'mal" (March: when you get around by canoe);
- "Lasa ya'a (April: when you start catching sprinf salmon);
- "Lasa yu'ja" (May: When leaves come out);
- "Lasa maa'y" (June: Berries are forming)
- "Lasa wiihun" (July: when fish come up the Skeena River);
- "Lasa lik'insuocq" (When grizzlies kill fish)
- "Lasa gangwiikxs" (When they hunt for groundhogs).

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Reflection: Student's Reports UNIVERSITY OF THE FRASER VALLEY

REPORT:

"As a mathematics teacher and educator, the Bella Coola experience was indeed a **transformative** one. A particular strength of the experience was illuminated in **how the students through their individual research project did create connections between their understanding of mathematics, and Indigenous knowledge and their own cultural practices, history, and life experiences.**"

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Reflection: Student's Reports UNIVERSITY OF THE FRASER VALLEY

REPORT:

"The research project **illuminated and "unearthed" the mathematics and the "weave" connections between the indigenous students' understanding of mathematics (and other disciplines) and their own communal or cultural practices, history, and life experiences – essentially the Indigenous knowledge and ways of knowing and doing."**

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Student's Report: Various Uses of Cedar UNIVERSITY OF THE FRASER VALLEY

REPORT:

Science and Math using Cedar

- (1) building a canoe,
- (2) weaving hats,
- (3) clothing,
- (4) making rope,
- (5) building plank houses,
- (6) carving a pole,
- (7) making baskets.

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WRAP-UP: SOME FINAL THOUGHTS

Potlatch as Pedagogy Learning Through Ceremony



Sara Florence Davidson and Robert Davidson

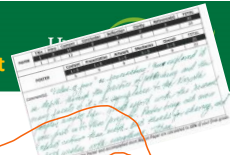
Potlatch as Pedagogy – Learning Through Ceremony by Sara F. Davidson and Robert Davidson.

- Learning emerges from establishing strong relationship – experience as a non-indigenous teacher. e.g. from UFV to Bella Coola
- Authentic learning experience is not restricted to what is happening in the classroom – quite often they take place outside. e.g. students' findings, report and posters
- Learning must be applicable, and that learning about one's life outside can reinforce what is learned inside. Sole purpose of school is not "to do better in school" but also outside of it, that is, the worlds they inhabit outside of school! e.g. class activities (bear & fish)
- Learning is embedded in any cultural activity. e.g. canning, canoe, potlatch, grease trail
- Learning is embedded in the research activity. e.g. students' findings, report and posters
- Learning emerges from curiosity and from the questions being asked. e.g. research project

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Program OUTCOME: Math 105 NC1 Course Assessment

Final Exam	35%
Major Research Project	15%
Assignments (3)	25%
Class Activities: Individuals or Pairings	5%
Group Activities & Poster Presentations	20%



LOCAL MATH TUTOR

The College hired a math tutor (who happened to be non-indigenous, from the local high school) to meet and assist the students in their written homework and final exam preparation. He was also asked to sit-in as an observer in some of my classes. [FORGOT TO MENTION IN MY TALK!]

	Research Project (15%)	Group Activities (20%)	Individual Activities (5%)	Homework Assignments (25%)	FINAL (35%)	Score 100%	FINAL GRADE	FINAL EXAM
0002	12.0	16.4	5.0	21.0	22.1	76.5	B+	63.0%
0003	12.0	17.6	5.0	22.9	21.7	79.2	B+	62.0%
9970	13.8	17.1	5.0	22.6	18.2	76.7	B	52.0%
0011	13.2	17.1	5.0	20.5	20.8	76.6	B	59.5%
9958	12.9	17.6	5.0	22.4	24.9	82.7	A-	71.0%
9963	10.8	16.4	4.5	19.0	15.6	66.3	C+	44.5%
9902		11.3	2.5	7.9	24.5	46.3	I	70.0%
9969								
0030	11.7	16.4	5.0	18.8	11.9	63.0	C	34.0%
9312	10.8	16.4	4.5	17.8		49.5	I	15.5%
0196	11.7	17.6	5.0	20.0	24.9	79.1	A-	71.0%
9878	11.7	17.1	5.0	22.8	25.6	82.2	A-	73.0%
0019	12.6	17.1	5.0	21.8	22.9	79.5	B+	65.5%

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## Additional Resources

- (1) Math 105 NC1 Students' Research Project and Poster Presentations.
- (2) The First Peoples Principles of Mathematical Teaching  
[<http://www.fnesc.ca/math-first-peoples/>].
- (3) Mathematics Assessment Resource Service  
[<http://map.mathshell.org>].



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## Inspiration #1: BC's Redesigned Curriculum

### Aboriginal Perspectives and Knowledge

Aboriginal culture and perspectives have been integrated throughout all areas of learning. For example, **place-based learning** and emphasis on **indigenous ways of knowing** reflect the First Peoples Principles of Learning in the curriculum.

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## Inspiration #2: First Peoples' Principles of Mathematical Teaching

### Respecting Indigenous Knowledge \*

1. **Build on indigenous knowledge systems.**
2. Relate story teachings to mathematical processes (e.g., how characters solve problems).
3. **Make connections to a wide range of differing contexts (daily activities, traditional practices, activities in the workplace) and integrate learning related to mathematics and other subject areas in project assignments.**
4. **Find ways to build learning relationships with the local Aboriginal/cultural community (Elders, artists, people in various walks of life, including emergent business and industry).**

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## Inspiration #2: First Peoples' Principles of Mathematical Teaching

### Respecting the learner

5. **Build on what students are already familiar with (both abstract "knowledge" and concrete knowledge).**
6. **Explore and build on students' interests (asking learners about what is important to them is a good way to identify what context will prove meaningful to them as a basis for learning mathematics).**
7. Present mathematics problems of various sorts in varied ways (visual, oral, role-play, and experiential problems as well as word and symbol problems).
8. **Stimulate students' innate curiosity and desire to explore.**

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## Inspiration #2: First Peoples' Principles of Mathematical Teaching

### Fostering the development of positive attitudes

9. **Communicate a positive and enthusiastic attitude toward mathematics (be willing to take risks and make mistakes and encourage students to do the same).**
10. **Promote and reward perseverance (give necessary time for difficult problems and revisit them on multiple occasions).**
11. Use humour and celebrate successes.

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## Inspiration #2: First Peoples' Principles of Mathematical Teaching

### Fostering transformation for both teacher and student (transformative pedagogy)

12. **Reflect on and revise your own practice with respect to teaching mathematics (including mistakes).**
13. **Find ways to build learning relationships with various professional communities where mathematics plays an important role.**
14. **Share what you are doing as a teacher with other colleagues, and use colleagues to support self-reflection.**
15. **Encourage students to reflect on and be explicit about their own thinking processes and the transformations in their own understanding.**

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