

Use of Indigenous Elements in Teaching Mathematics and Science

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Indigenous Knowledge and Science

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Objectives

- Making modern Science and Mathematics more attractive for Indigenous youth
- Encouraging post-secondary Indigenous students in Science and Mathematics programs
- Developing teaching materials for Science and Mathematics based on Indigenous Knowledge
- Use of Indigenous Art in developing teaching materials for Science and Mathematics

Project Phases

- Interviews with Indigenous Elders and Knowledge Keepers
- Work with First Nations schools across Canada (*annual Wiseman Mathematics Contest*)
- Work with Indigenous students in the Education program of FNUniv
- Developing mathematical terminology in Cree (*Cree Dictionary of Mathematical Terms*)
- Developing visual mathematical examples using Indigenous Art
- Developing online resources (*project websites, UofR Pressbook portal*)

Interviews with Indigenous Elders and Knowledge Keepers

- Indigenous Elders' recommendations:
 - ✓ Eliminate negative effects of residential schools
 - ✓ Make Science and Mathematics “Indigenous-friendly”
 - ✓ “Start teaching a child right from the birth”
 - ✓ Use Indigenous elements in teaching Science and Mathematics

Wiseman Mathematics Contest

- A nationwide annual mathematics contest for First Nations schools
- Started in 2009. Thousands of Indigenous students participated in the Contest (grades 4, 5 and 6)
- In 2016, the Regional Centre of Expertise (Saskatchewan) on Education for Sustainable Development Recognition Program acknowledged the Wiseman Mathematics Contest as an innovative project.
- The project has helped to increase the capacity for sustainable development in the Saskatchewan region and contributed to the advancement of the UNESCO Global Action Programme on Education for Sustainable Development.

Wiseman Mathematics Contest



Wiseman Mathematics Contest

- One of the long-running nationwide mathematics contests
- Preparatory materials are provided
- Zero cost
- Appreciations
 - ✓ Certificates for participants and teachers
 - ✓ Elder Ken Goodwill Memorial Certificates for best performing schools

Work with Indigenous Students in the Education Program of FNUniv

- EMTH 215 course teaching experience at FNUniv
- Future teachers at Indigenous schools
- Encourage to develop and include Indigenous elements in their lesson plans
- Counting in Indigenous languages in mathematics classes
- Use of relating Indigenous games in classroom activities

Work with Indigenous Students in the Education Program of FNUniv



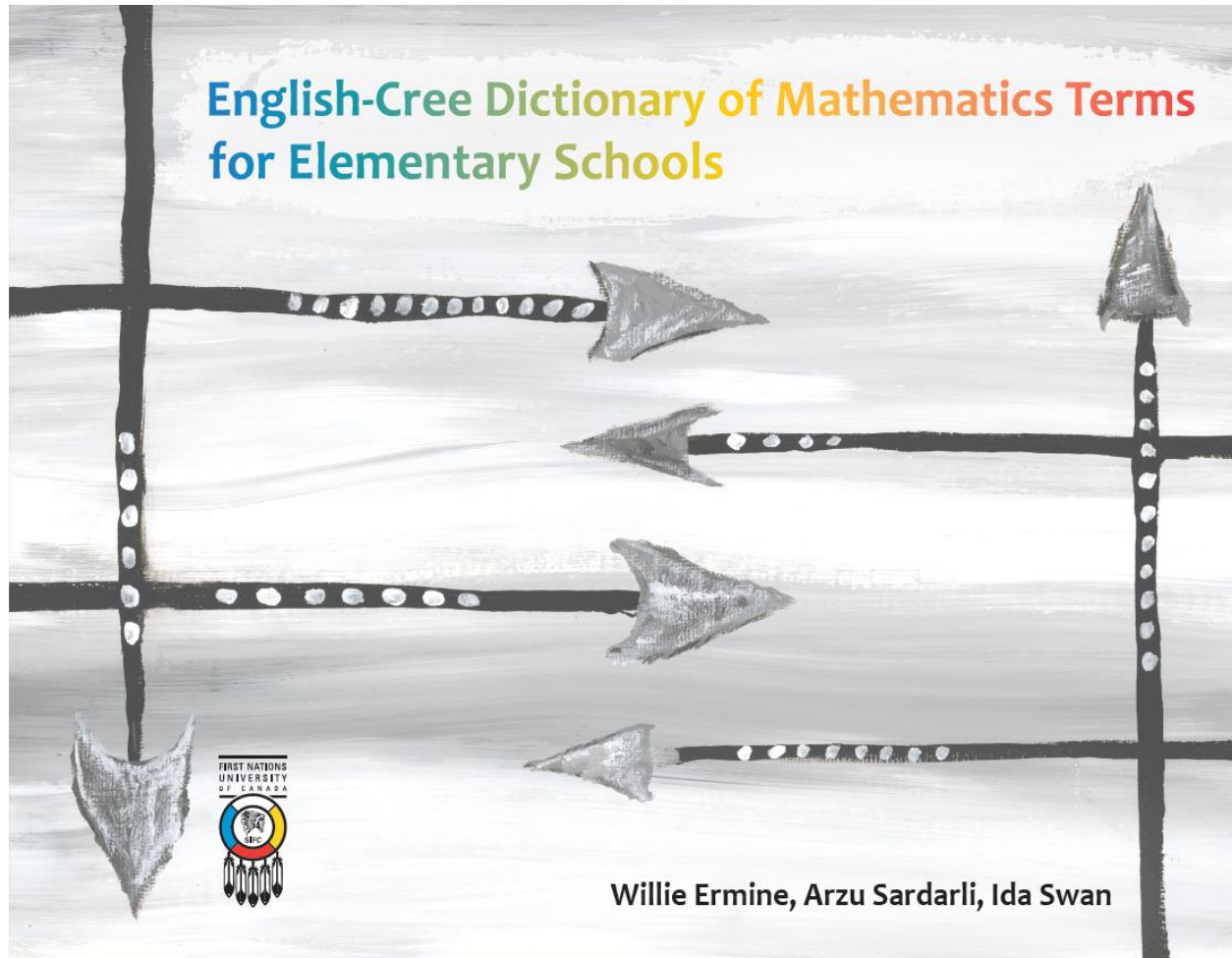
Developing Mathematical Terminology in Indigenous Languages

- Developing school and post-secondary programs in Indigenous languages
- Lack of mathematical terms in Indigenous languages
- Various dialects of Indigenous languages
- Terminology composition
- Consensus is needed

Developing Mathematical Terminology in Indigenous Languages

- Cree Dictionary of Mathematical Terms, 1st edition
 - ✓ Project supported by FNUniv
 - ✓ Elder's review
 - ✓ Cree-speaking educator's review
 - ✓ Presented to schools of Cree Nations across Canada
- Surprising interest of Non-Indigenous students and educators
- Requests about extra copies

Developing Mathematical Terminology in Indigenous Languages



Developing Mathematical Terminology in Indigenous Languages

- Cree Dictionary of Mathematical Terms, 2nd edition
 - ✓ Project supported by the University of Regina within the Open Educational Resources
 - ✓ Various electronic formats (PDF, Epub, html)
 - ✓ Visual examples with Indigenous elements
 - ✓ Accessibility via Pressbook Internet portal

Developing Mathematical Terminology in Indigenous Languages



CREE DICTIONARY OF MATHEMATICAL TERMS WITH VISUAL EXAMPLES



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METADATA

TITLE

CREE DICTIONARY OF MATHEMATICAL TERMS WITH VISUAL EXAMPLES

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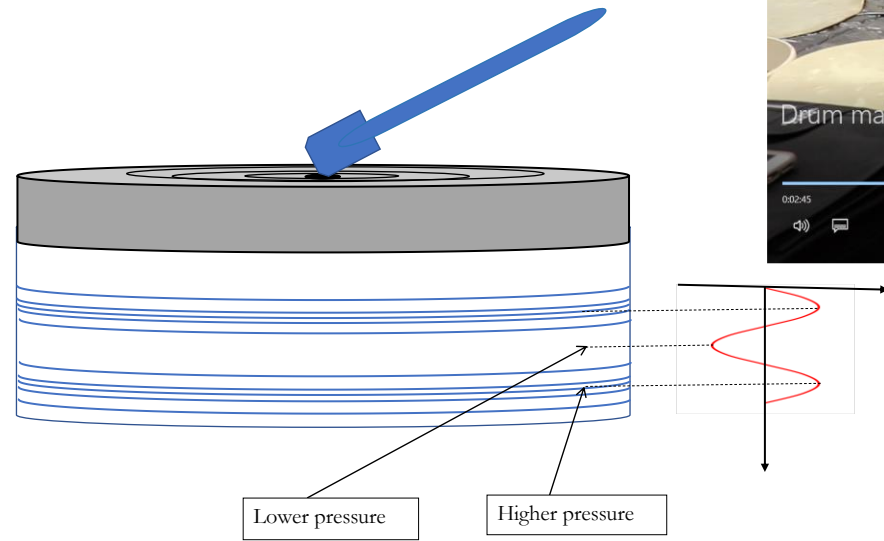
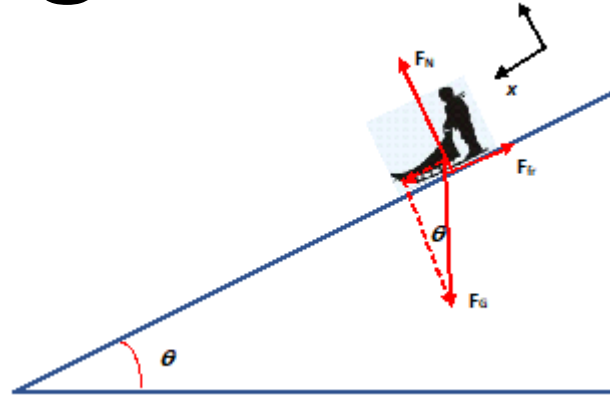
Chemistry,
Biology,
Physics
experiment



Use of Indigenous Elements in Teaching University Courses

- Physics
 - ✓ Tipi (heat conservation)
 - ✓ Drum (sound waves)
 - ✓ Dog sleds (friction)
- Mathematics
 - ✓ Various counting systems of Indigenous people around the world
 - ✓ Geometrical properties of tipis and other Indigenous constructions around the world
- Statistics and Probability
 - ✓ Indigenous games (based on chances)

Use of Indigenous Elements in Teaching University Courses



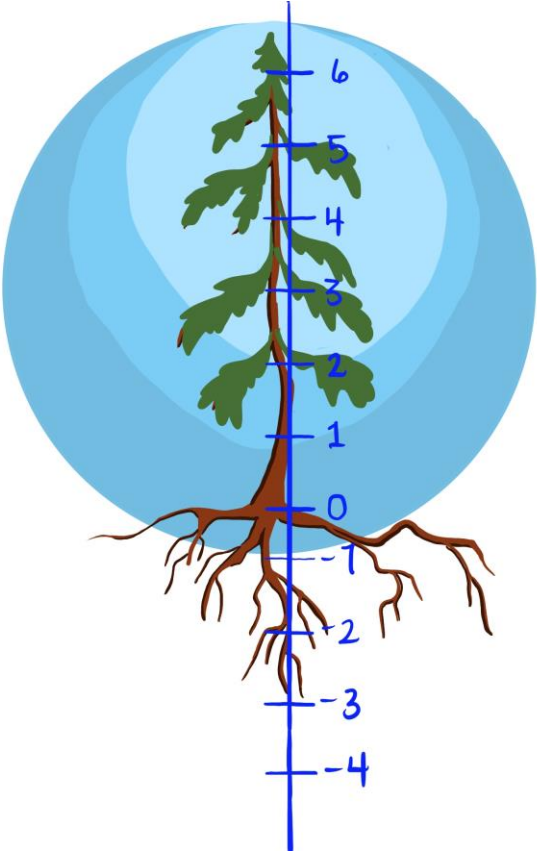
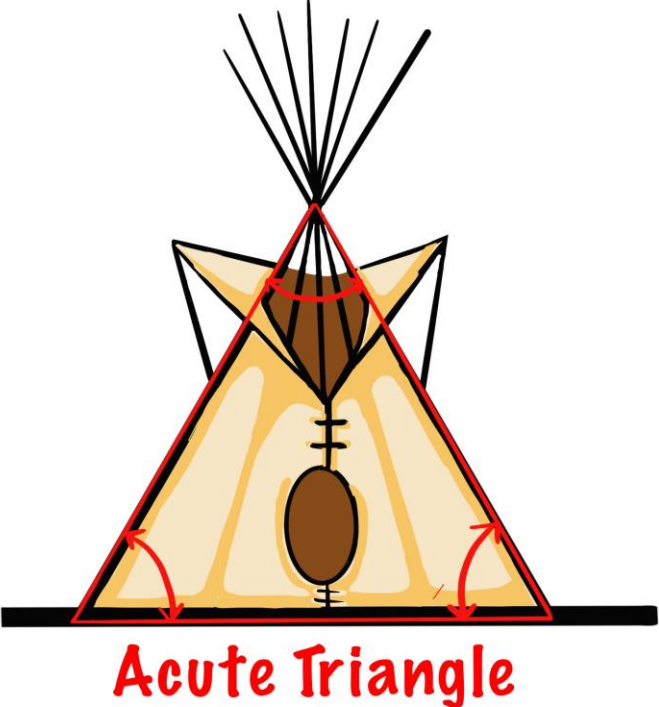
Use of Indigenous Elements in Teaching University Courses

- Physics
 - ✓ Introductory Physics textbook with Indigenous elements (in collaboration with colleagues from the University of Regina)
 - ✓ PHYS 140 (in collaboration with colleagues from University of Regina and University of Calgary)
- Mathematics
 - ✓ Mathematical modeling of water quality dynamics using Indigenous Knowledge (community-based research project)
- Statistics and Probability
 - ✓ Introductory Statistics textbook (Sardarli, Volodin)

Use of Indigenous Art in Teaching University Courses

- Integrative perception of knowledge by Indigenous people
- Indigenous view of Art
- Indigenous Art and mathematical examples

Use of Indigenous Art in Teaching University Courses



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- Indigenous Elders and Knowledge Keepers
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- My undergraduate students from FNUniv and University of Regina
- Participants of the Wiseman Mathematics Contest and their teachers across Canada
- My colleagues
- Funding agencies who supported and keep supporting my projects

Indigenous Knowledge and Science. A Brief Philosophical Meditation ...

- “Western Science”, “Indigenous Science” and other problems of politicized terminology
- “Knowledge” vs. “Science”. The exact translation of “Science” in other languages.
- Does “Science” contradict to “Knowledge”?

Education is a light ...

