

Weaving Indigenous Knowledge with Mainstream Science using Canada's Synchrotron



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de rayonnement
synchrotron

Introduction- Dallas Pelly- Education Specialist - Indigenous Relations at CLS



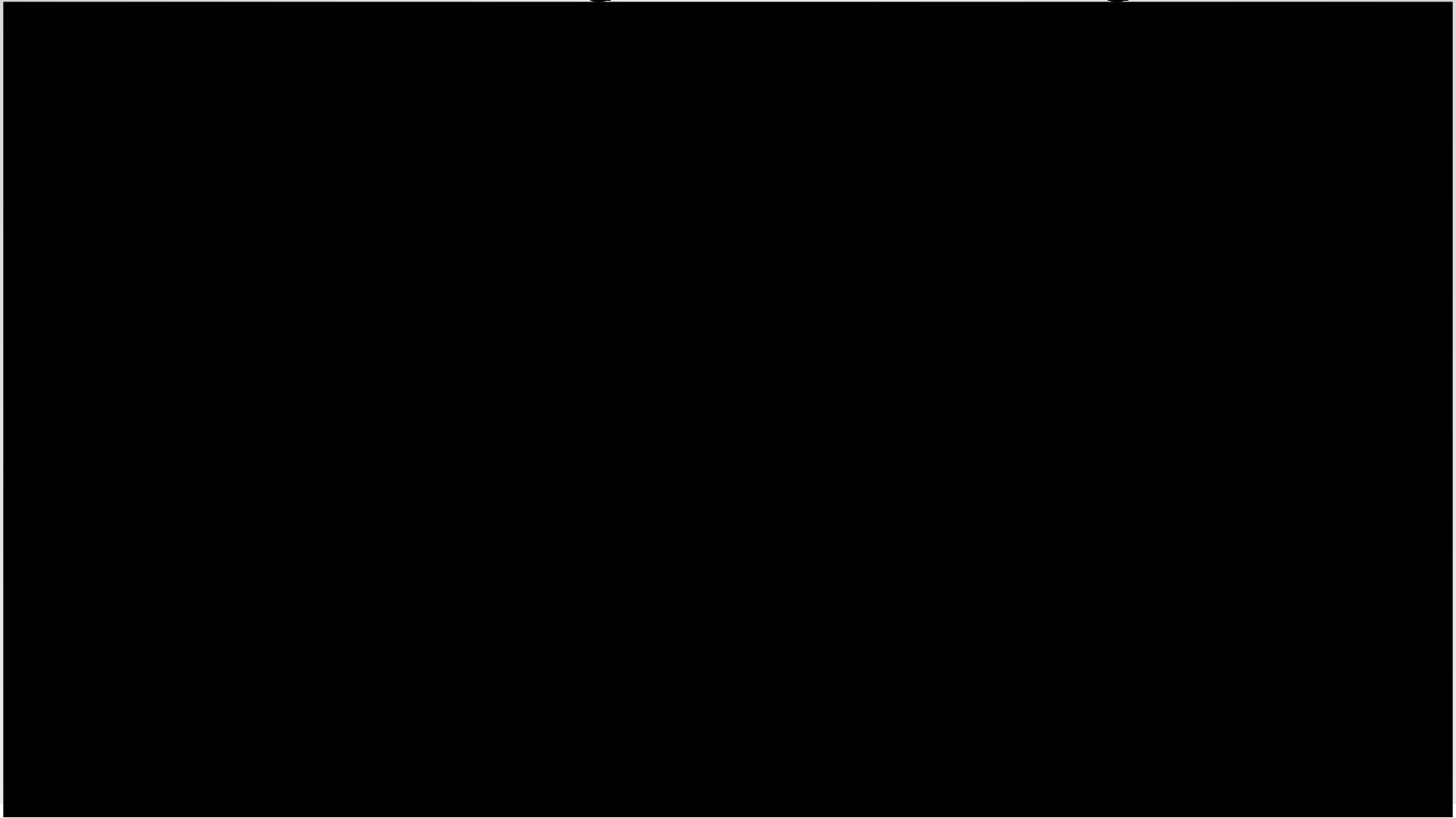


Late Elder Pauline Pelly

Education is vital to teach our young people to be professionals and to enable them to continue negotiating for our rights. This will be the basis of our future and our survival as First Nations people.

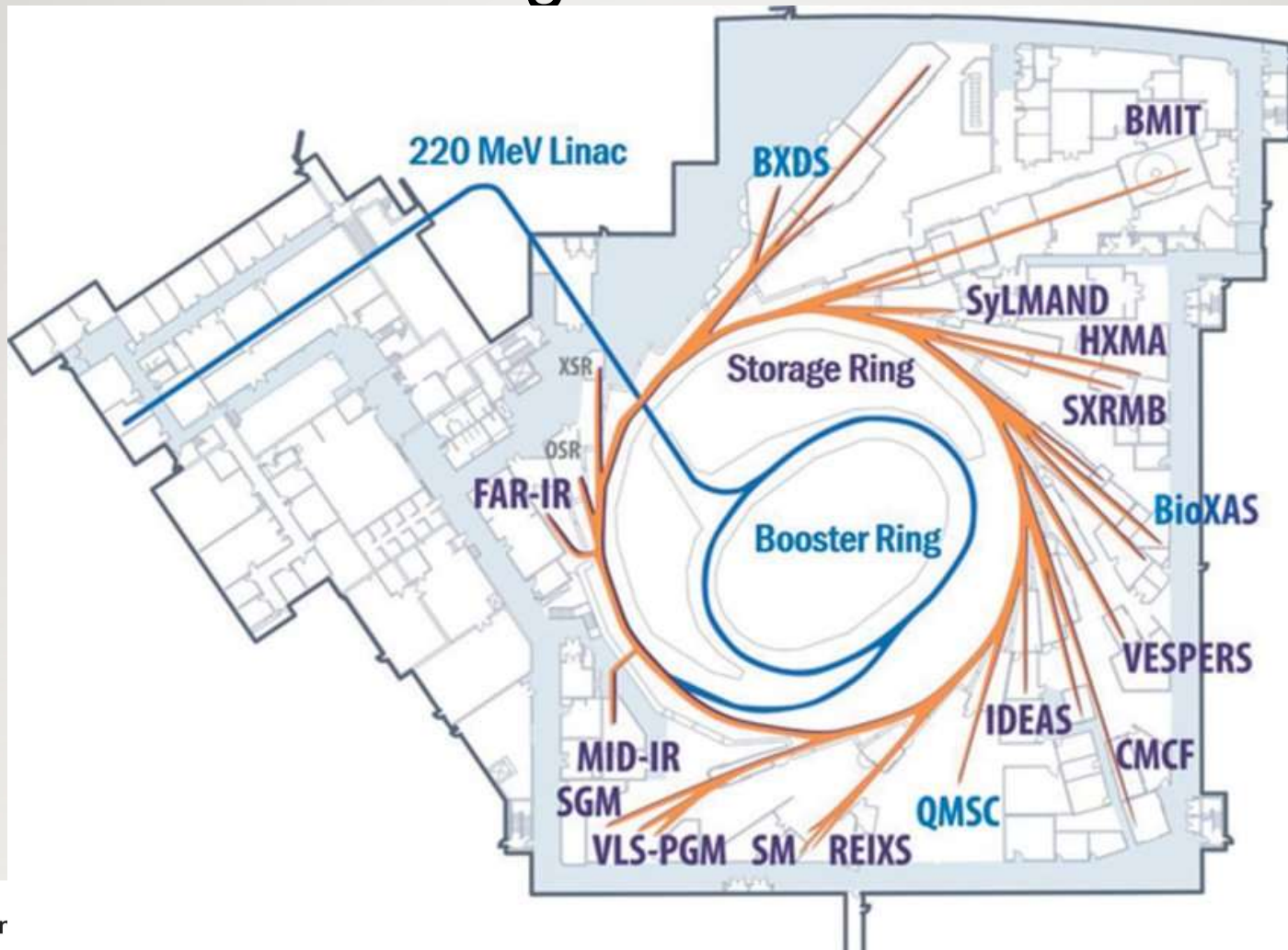


The Canadian Light Source at a glance



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The Canadian Light Source

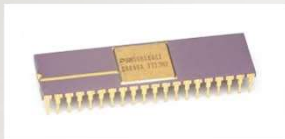


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CLS Research Examples:

Device Fabrication



Pharmaceuticals



New Materials Development



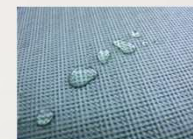
Medical Imaging



Minerals & Mining



Surfaces & Coatings



The "swiss army knife" of scientific research



Agriculture



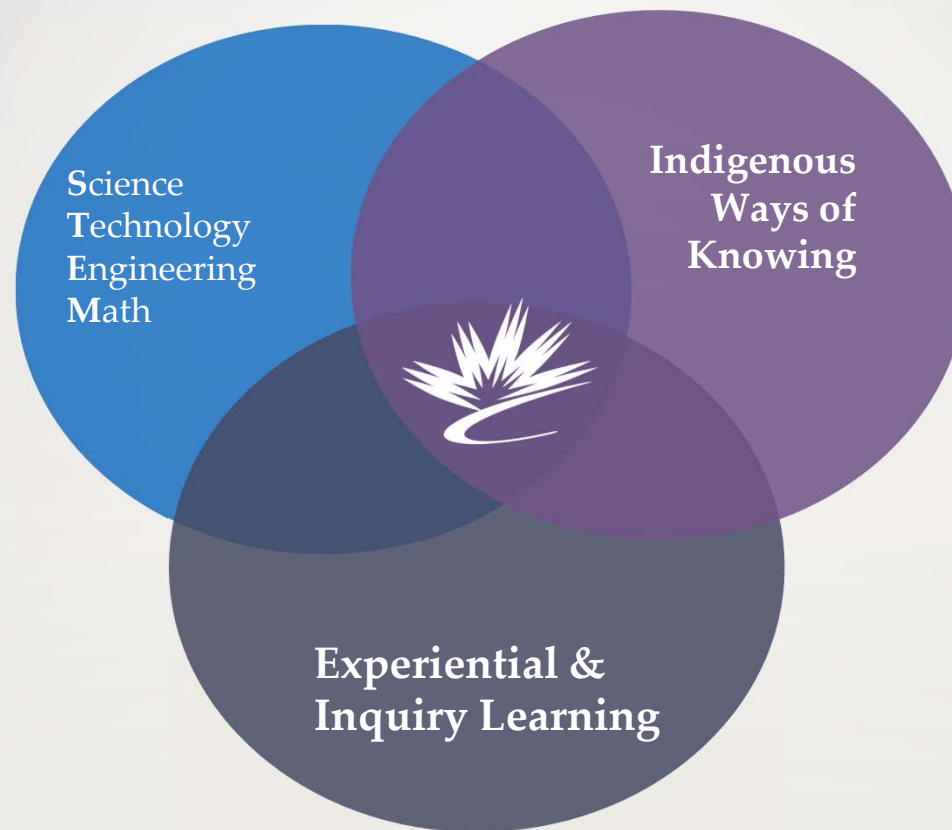
Aerospace



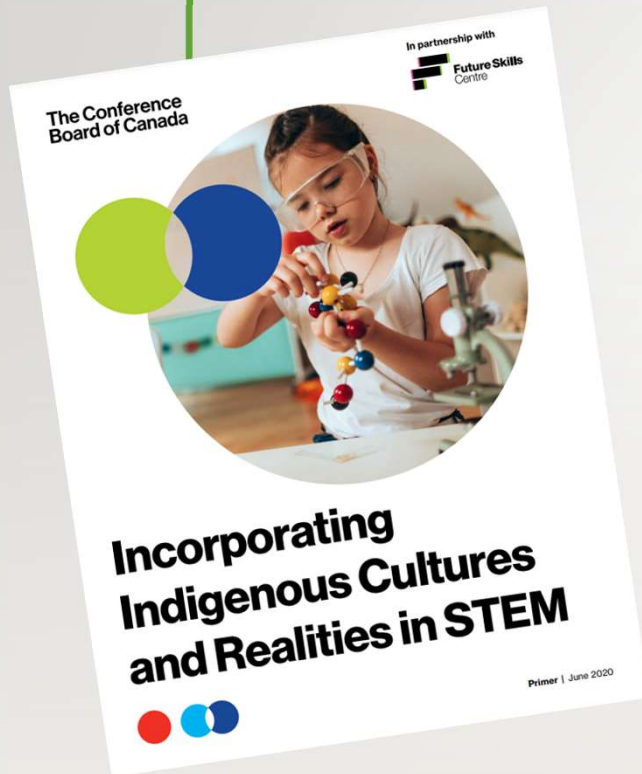
Cell Structures & Disease



CLS Education Overview



Why do this work?



Indigenous people make up 4 per cent of adults in Canada. But less than 2 per cent of people working in science, technology, engineering, and mathematics (STEM) occupations are Indigenous (Statistics Canada 2016 Census).

Ways of Knowing

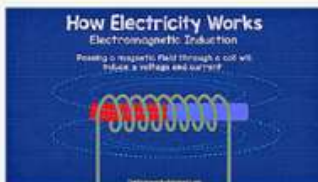
And people in STEM occupations—such as engineers, doctors, and scientists—have political as well as economic influence, and can play strong leadership roles.

If we are going to address the current issues and crises in the world, we need strong leaders with varied perspectives.



Mainstream Science Timeline & Indigenous Contributions

Electromagnetic Induction



1831

First Residential School Opens - Mohawk School



Cell Theory is Formulated

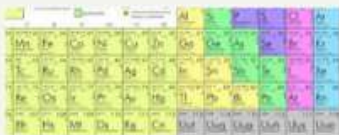


1839

First Reserve Created



Periodic Table Developed



1869

Crown purchases land from Hudson Bay Company



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Years



Canada's only Synchrotron Concept Born

Canada's last Residential Schools close 1996-7



1996



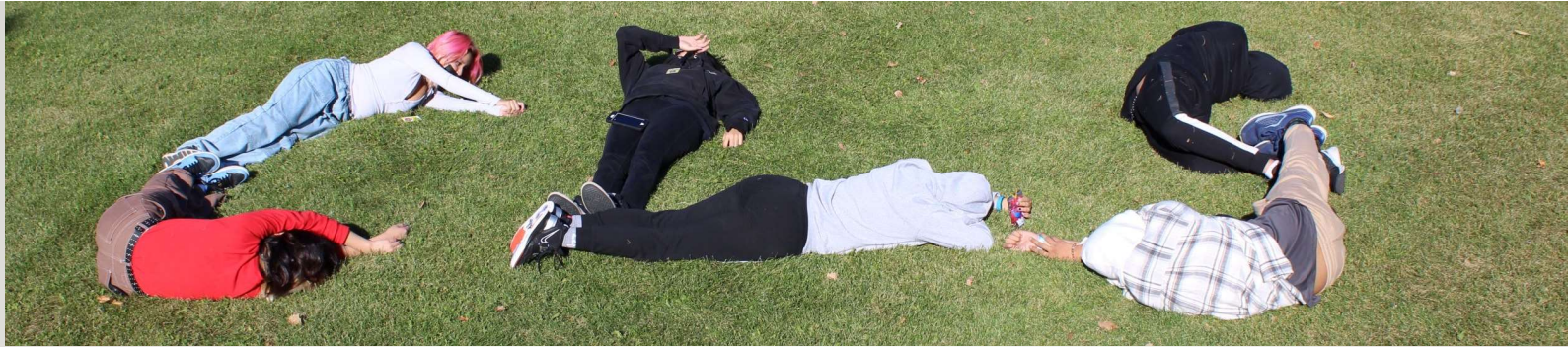
Discovery, Trust & Reconciliation

2021

Discovery, Trust & Reconciliation



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Carry the Kettle First Nation Community involvement with Elders, Teachers, and Students




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Traditional Cultural Expressions (Janice Osecap)




Braiding Knowledges To Support Educators






Rock : carries the knowledge of the world



Biggest takeaways:
While participating in a Soil focused LISSE presentation that included the testing of trace elements within the samples, I connected my Indigenous Knowledge that was passed to me through Traditional Ways of Knowing with XRF data produced on IDEAS.

While it is important not to focus on validation, this connection brought about a feeling of pride in the knowledge of my ancestors, and that they are in fact scientists.



A feather: openness, understanding, and willingness to learn

Start here

Acknowledgements:
The Elders/ancestors that continuously guide me through my journey to reculturate our youth.

What I learnt:
I was fortunate to be surrounded by a supportive community that invited me into absolutely anything I found an interest in. My learning experience included a wide variety of hands-on as well as virtual experiences. I had an opportunity to shadow and participate in a variety of mediums, in person as well as on-line presentations.

- Sample prep
- How to read XRF data
- The effort that goes into workshops
- How to maintain focus
- Editing skills
- What teamwork looks like
- Hands-on crystalizes knowledge
- Importance of community

I was challenged to quit validating why Indigenous perspectives should be included.

Comfort is a determiner of the level of participation with various types of learners. If a student was able to make a meaningful connection within a foreign space, that can increase a student's confidence. Recognizing my instant reaction of seeking validation encourages me to continue to focus my work while at the CLS to gravitate around creating resources for students that are meaningful. Resources that stem from the Saskatchewan Science Curriculum and are compatible with my ancestors as a way of integrating our science in a culturally safe way.

Outcomes of your work experience/challenges:
The biggest challenge was rewiring my automated response of seeking validation for my work. As a student of science in the 1990's and again in 2017, with the addition of psychology, I was able to understand how the history of my ancestors has affected me and this understanding is what fuels my ambitions to represent our Indigenous perspectives.

At CLS:

- Took part in workshops
- Developed a guide on how to engage in indigenous research in a culturally safe way
- contributed by sharing Indigenous connections and how to connect with Indigenous students.
- Created resources that educators use to can present the periodic table that students connect with
- Assisted in LISSE dissemination at 2 of the local high schools


Introduction of Self:
Niya-nitsikason Janice Osecap ekwa Niya ohci Moosomin First Nation. I recently convocated from the Indian Teacher Education Program (ITEP) at the College Education, here on Treaty Six territory the University of Saskatchewan occupies.

The concentration of my studies while in University have circulated around becoming competent in science, as well as psychology so I can understand and contribute by making meaningful resources for educators who want to engage in Indigenous sciences. This summer I was fortunate enough to secure a summer internship with the Canadian Light Source education team that had a coinciding goal of normalizing the presence of Indigenous inclusion in science.


While many may not understand the importance of this and how it relates to the science community, it is an effort that focuses on student confidence rather than student competency. Participating in science is a difficult task within itself which can be magnified when feeling displaced in a secular community that removes culture, race, and spiritualism. My projects focused on supporting educators in terms of resources they may be able to use in their respective classrooms


Acknowledgements:
The Education Team At CLS for continued support and guidance throughout my summer experience. Tracy Walker, Bernie Petit, Amanda Pfeiffer, Noah Dyck, David Muir, and Robert Blythe.

A feather on my head: honoring my relations/ knowledges by always being a student in training



Braid of sweetgrass: me, science, and culture







Traditional Cultural Expressions (Janice Osecap)

																	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955912	22 Ti Titanium 47.867	24 Cr Chromium 51.9961	25 Mn Manganese 54.938045	26 Fe Iron 55.845	27 Co Cobalt 58.933195	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.63	33 As Arsenic 74.9216	34 Se Selenium 78.96	35 Br Bromine 79.904	<small>© 2011 nyanabio.com</small>	

Language Ties:

pipikwahcaw pee-peek-wah-tso (Cree/Neheyawak): Soil/dirt

Creation Story/Story/History:

Creation Story : Legend of Turtle Island

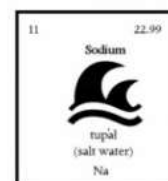
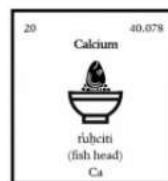
This story takes us back to how the world was rebuilt, when a slew of courageous animals dove to get the one thing needed; earth/soil

Connection(s):

Traditional Medicine: Eating dirt was associated with building up immunity.

Ceremonial: Soil/dirt is an important part of our ceremonies in many ways, but one example is that when we are picking our medicines, the soil is representative of our Mother Nature.

Potassium is an essential nutrient for most living things and is abundant in rocks and soil.



Images and translations provided by Anne Mack & Brittany Morgan

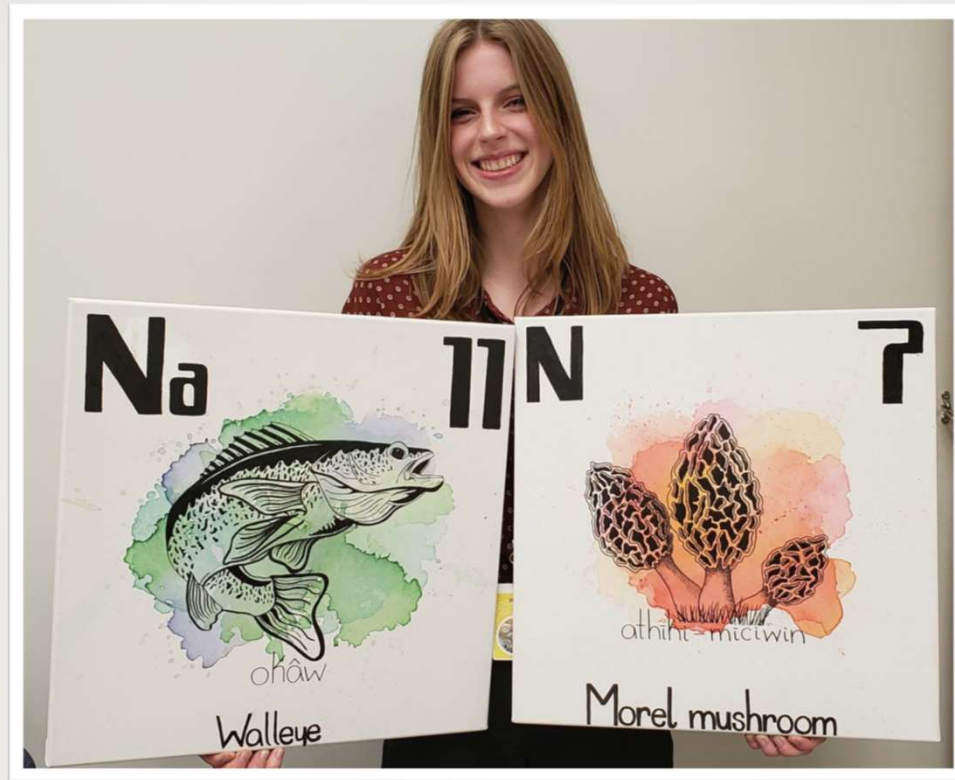


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Mila Kuppenbender

Weaving Indigenous Knowledge with the Periodic Table



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New Focus: Providing Professional Development for Teachers across Canada



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Indigenous Perspectives in Chemistry and Physics

A Virtual Professional Development Opportunity

Explore Indigenous knowledge systems in chemistry and physics!
Join this professional development to learn about Indigenous contributions, culturally responsive teaching strategies, and advice from an expert panel!

When: August 8th, 15th, 22nd

Where: Virtual - Zoom

Who's Invited: All Educators

- Anyone who is interested in broadening their understanding in creating space for Indigenous perspectives in chemistry and physics

Cost: Free

Have questions?

Contact us at education@lightsource.ca



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Indigenous Perspectives in Chemistry and Physics- August 8th, 15th, and 22nd at 5pm CST!

Receive **resources** with each session that supplement the discussions and could be used in your classroom.

Get a chance to **network** with like-minded educators.

Each **session** can be attended on its own but the most learning will come from attending all 3 sessions!

Experience a discussion with our **expert panel** that include scientists, educators, and an Elder!

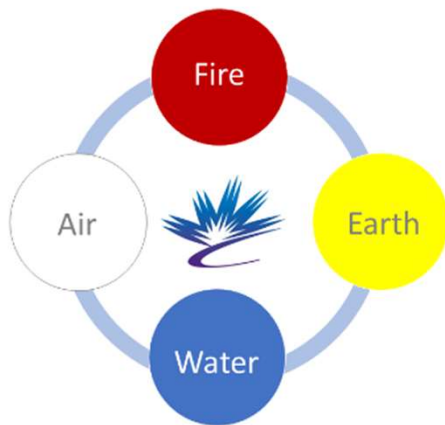
Gain unique **insights and strategies** that help make chemistry and physics more welcoming.

Join us in the **comfort of your own home**.

Be entered into a **Prize Draw** and get a **Certificate** if you attend all 3 sessions.



Indigenous Educational Resources



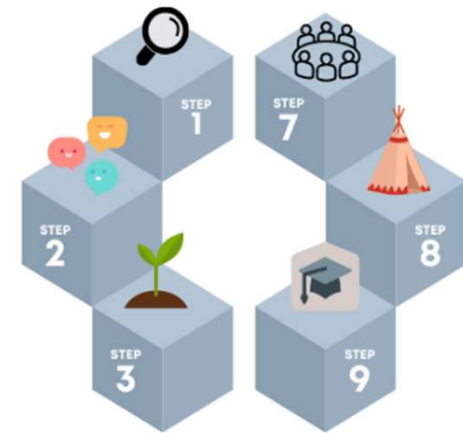
Science of Bannock

Making bannock is more than chemistry. Take a look at how chemistry, physics, and Traditional Knowledge come to play!



TREE Program

Our TREE program offers the opportunity for a class to connect to the land and investigate the stories from trembling aspen trees.

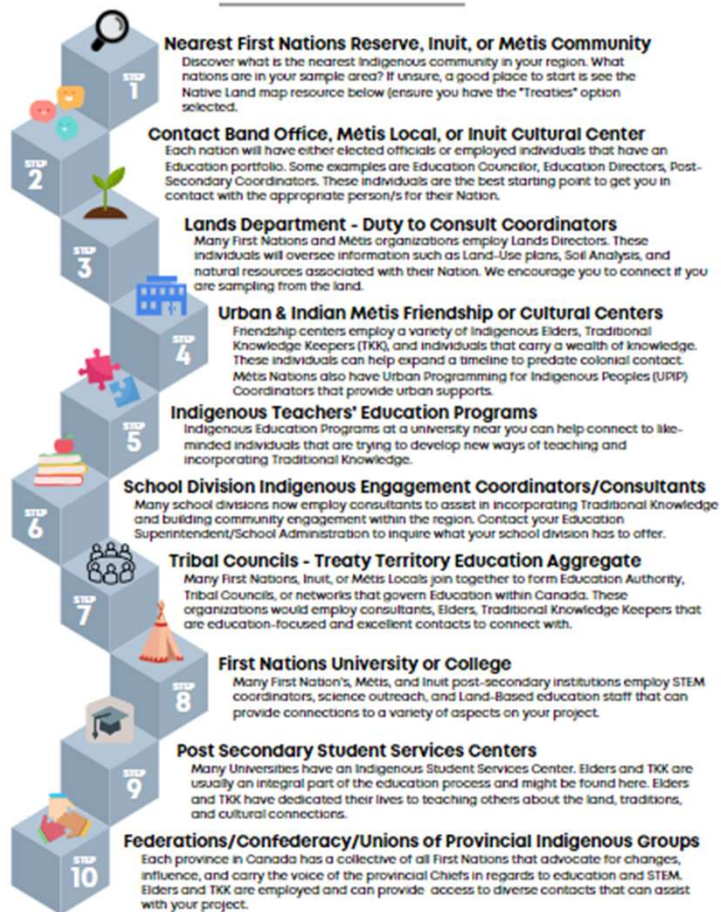


Indigenous Engagement Tips

This resource helps supports students and teachers wishing to engage with Indigenous groups in their science projects or classes!



Where to Start with Indigenous Engagement



CLS Resources Document



Thank you

Elders Advisory Council

Norman Fleury, Tim Eyashappie, Kathy Wapehpah, Cecile Smith



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Thank you

Thank you to our government, academic and corporate funding partners for their investment in Canadian science & discovery.

OPERATING



CAPITAL



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Thank you and Questions

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