Decolonizing the Engineering Curriculum

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PAMELA WOLF; ALEX GONZALEZ; CURTIS RATTRAY; DEBALINA SAHA; JAMES SHAW; NIKA MARTINUSSEN; AND BEN HARRIS

ERIN FIELDS AND CLAIR SWANSON

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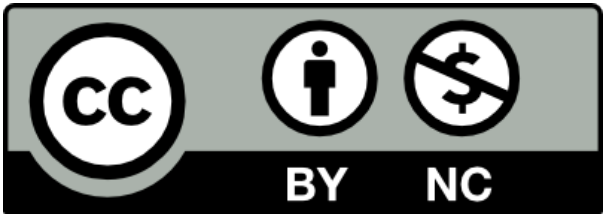

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Acknowledgements

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This reconciliation+design work was founded and led by UBC Assistant Professor of Teaching Pam Wolf, and created in a rich collaboration with all of the following people.
Tahltan Nation member Curtis Rattray gave guidance and council on what we out to be curious about and have competency in.
Undergraduate engineering students Debalina Saha, Alex Gonzales and James Shaw created the module materials, and Ms. Saha coached faculty on how to implement this successfully in their classrooms.
Countless faculty members supported, gave feedback and piloted this project.
Undergraduate students Nika Martinussen and Ben Harris enhanced the module materials into the open educational resource that you're reading now.
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How to Use this Resource

Reconciliation+design is a set of adaptable resources developed to enable Engineering faculty to include Indigenous reconciliation in engineering courses. These resources consist of lecture slides, sample assignments, and rubrics are primarily centered around decolonization. Your role will be to teach the decolonization curriculum from your perspective.

Indigenous voices are added via the reconciliation+design dialogues that you and your students are invited to. You may attend the annual cycle of events as they occur, or use the recordings. The advantage of these large-scale events is that they amplify Indigenous voices across many audiences without putting undue burden on Indigenous community members.

Instructor Trainings

This resource begins with five trainings for instructors:

1. Decolonization
2. Ways of Knowing
3. Systems Thinking
4. Facilitating Difficult Discussions
5. Land and Title Rights

These trainings are intended for instructors to complete before implementing the learning modules into the classroom. The trainings include videos, readings, additional resources, among other content, to provide a foundational knowledge base on some of the key concepts that are covered in the learning modules.

Learning Modules

The content provided in our decolonization curriculum is broken into three modules. These modules include lecture slides, lesson plans, assignments, and corresponding rubrics. Slides and rubrics may be modified as needed to be tailored to your specific teaching style.

The module competencies are:

1. Module 1 – Dialogue and Engagement, Including Listening
2. Module 2 – Recognizing Social Context (Understanding Indigenous Values, Ways of Conducting Business and Governance Styles)
3. Module 3 – Designing for Communities

These resources were developed for use in combination with coaching support. Coaches are not included in this open educational resource due to funding constraints, but the materials have been modified to be self-navigating. We gift you these resources and ask that you contact us at pamwolf@civil.ubc.ca to continue research measurement.

Wireframe for the Decolonization Curriculum

Attached below is the wireframe for the decolonization curriculum, which shows the learning objectives for each module.

Decolonization the Engineering Curriculum - Wireframe

Module	Core Topic	Corresponding Assignment
1	Starting Dialogue and Systems Thinking	Starting Dialogue with K'omoks Nation - Insulating glass project
2	Addressing and Synthesizing different "Ways of Knowing"	Synthesizing Ways of Knowing - Wet'suwet'en Pipeline case study
3	Guiding Engineering Work with Social Context	Developing Stakeholder/ Rightsholder Engagement Plan

Module	Learning Outcomes - After the completion of the assignment, students will be able to:		
	Cognitive (Knowledge)	Psychomotor (Skills)	Affective (Attitudes)
1	-Describe the characteristics of simple and complex systems -Express the complexity of intercultural partnerships through the generation of a systems map	-Locate mutually beneficial, sustainable partnership objectives among a list -Select an appropriate community contact on a First Nation's website -Re-create a collaboration systems map based on a relevant example	-Acknowledge the importance mapping communication channels -Formulate a personal understanding of respectful email communication

Decolonization the Engineering Curriculum - Wireframe			
2	-Define “way of knowing” -Appraise the strengths and limitations of the empirical way of knowing -Synthesize two cross-cultural perspectives to create a shared strategy with polarity mapping -Differentiate normative claims from prescriptive claims	-Construct a polarity map based on a general recipe -Demonstrate cross-cultural analysis by compiling the guiding principles of two ways of knowing	Express interest in uncovering personal and group biases -Reconcile and reframe apparent unresolvable, opposing problems by using a polarity map
3	-Critique personal, local and professional enforcement of colonial priorities across cultural boundaries -Recognize Indigenous legal and social authority in the consultation process -Produce a strategy to champion Indigenous values and knowledge in an engineering project (purpose, preparations, research and knowledge gaps)	-Use the The Aboriginal and Treaty Rights Information System (ATRIS) system to access local consultation considerations. -Articulate the connection between personal, communal and professional values -Identify intercultural knowledge gaps	-Relate engineering practice to it's local context through the practice of recognizing & synthesizing various ways of knowing -Act transparently when outlining the purpose and knowledge gaps when creating a knowledge strategy document

Indigenous Foundations

Indigenous Foundations is a cohort learning activity led by Jannik Eikenaar at the University of British Columbia, Okanagan, where you will learn about:

- Decolonization, Reconciliation, and Indigenization in Canada.
- Indigenous histories and contexts: how to become a well-

informed ally to Indigenous Peoples.

- Language, terminology, and tools for respectfully acknowledging Indigenous Peoples and their lands
- How to practice cultural safety in your daily work and life. We highly recommend contacting Dr. Eikenaar at Jannik.Eikenaar@ubc.ca to join one of the cohorts. His Foundations program provides an excellent education in the, well, foundational historical knowledge of Indigenous experiences in Canada.

How to Use Program Evaluation Tools

Guide to Student Surveys

Purpose: Student surveys will be used for both formative and summative evaluation. Student surveys will identify broad trends and identify issues for deeper discussion in student champion dialogues.

Students will self-assess their attitudes, beliefs, and levels of understanding of the three decolonization competencies through a qualtrics survey.

Decolonization competencies:

i) dialogue and **engagement**, including listening,

ii) recognizing social context, including understanding Indigenous values and ways of conducting business, and

iii) designing for communities, including social impact.

When: Please send these surveys out at the beginning and end of each term or course duration.

How: Please email pamwolf@civil.ubc.ca for the surveys.

DECOLONIZATION

Learning Objectives

Below, you can find the learning objectives for the Decolonization instructor training:

- Define **decolonization**.
- Recognize how decolonization is related to **postcolonialism** and **Indigenization**.
- Understand what decolonization looks like in the classroom.
- Recognize how ones behavior perpetuates **colonialism** and understand how to actively decolonize one's own thoughts & actions.
- Understand that you will (probably) be asked to think in ways you aren't used to thinking, and that's okay.
- Understand that learning about this is probably uncomfortable for you, and may also be uncomfortable for your students. Again, that is okay. Being uncomfortable isn't a reason not to expand your knowledge.
- Acknowledge that this work is important.
- Understand your role in this landscape as a decolonizer. Remember, your role is not to Indigenize.
- Recognize how your behaviour perpetuates colonialism and understand how to actively decolonize your own thoughts & actions.

Introduction to Decolonization

A YouTube element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=184

To begin, please take the time to watch the following TedxTalk (13 minutes). The Speaker, Nikki Sanchez, gives an overview of decolonization.

What is Decolonization?

> "*Decolonization refers to the process of deconstructing colonial ideologies of the superiority and privilege of Western thought and approaches*" (Antoine, A., Mason, R., et al, 2018)

It is critical to understand that colonialism occurred everywhere, not just in Vancouver or Canada. Colonization was (and continues to be) a traumatic time in history for Indigenous peoples all over the globe, including what is now called India, the United States, Canada, Australia, New Zealand, the Philippines, and the Caribbean, to name a few. During colonization, Indigenous peoples were forced to either assimilate or die to advance the notion of European racial & cultural superiority. Today, many Indigenous peoples in "Canada" are still primarily living under colonial rule.

When discussing decolonization in this lesson, we will start with a broad understanding of the term and then take a more progressive lens to approach decolonization in engineering classrooms.

However, before we dive into action, we must first understand how the concept of decolonization interacts with other theories.

Sources

Antoine, A.-na-hi, Mason, R., Mason, R., Palahicky, S., & France, C. R. de. (2018, September 5). *Indigenization, Decolonization, and Reconciliation*. Pulling Together A Guide for Curriculum

Developers. https://opentextbc.ca/indigenizationcurriculumdevelopers/chapter/indigenization-decolonization-and-reconciliation/

Decolonization, Indigenization, & Postcolonialism

A video element has been excluded from this version of the text. You can watch it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=186

Watch the "Decolonization: How Does it Interact with Indigenization and Postcolonialism"

Decolonization

The process of removing the problematic hierarchy of **colonial ideologies** and western methods of acquiring knowledge. We are surrounded by systems that privilege western ways of conducting business [1].

Example – Professional Communication

Conducting business through emails is widely accepted and expected from people around the globe. It is efficient and practical. In my experience, an Indigenous nation has a culture of people that prefer inviting you to their home for coffee instead. This is because they felt business emails lack authenticity. Understanding and accepting that both ways of approaching business are equally valid plays a crucial role in decolonizing ourselves.

Decolonization does not imply that western ways of conducting business are "bad" or "incorrect," but aims to remove western bias and create spaces that are inclusive and respectful to international cultures and **Indigenous Peoples**.

Indigenization

Indigenization is the process of incorporating Indigenous "**ways of knowing**", ways of learning, technology, guiding principles and knowledge systems into our schools, businesses, governments and institutions.

Decolonization is often confused with **Indigenization**.

Although everyone can benefit from **Indigenization**, not everyone can **Indigenize** curriculum.

With this in mind, it is important to emphasize that **Indigenization**:

- should be carried out by primary rights holders.
- does not aim to replace western knowledge.

Indigenization is best visualized as the act of braiding two distinct knowledge systems so that learners can come to understand and appreciate both [1].

Decolonization and **Indigenization** go hand in hand, and this is shown below.

Two-Step Process to Decolonization and Indigenization

Decolonization deconstructs the superiority associated with colonial ideologies to help create space for Indigenization.

Indigenization involves incorporating Indigenous sciences, maths, arts and other knowledge systems into our classrooms.

Example – Decolonization vs. Indigenization

Decolonization recognizes that there are multiple places to facilitate learning; a traditional classroom, on the land, by the river, in a lab. Indigenization would involve replacing a western teaching space or incorporating a specific component of Indigenous teaching to the classroom.

Reconciliation

According to the mandate issued by the Truth and Reconciliation Commission Canada (TRC), "reconciliation is about establishing and maintaining a mutually respectful relationship between Aboriginal and non-Aboriginal peoples in [Canada]" [2].

Everyone has a role to play in **reconciliation**. Decolonizing ourselves, our communities and our institutions is part of our role in truth and reconciliation as engineers.

Postcolonialism

Postcolonialism is a term that has been used to refer to current governance structures in Canada. But is Canada a postcolonial state or a colonial state? Postcolonialism refers to the study of a region or culture after colonization has occurred. Colonialism, as I'm sure we're aware, "is a practice of domination, which involves the subjugation of one people to another."

So before we link decolonization & postcolonialism, let's take a step back.

Canada as a country gained independence from Britain in 1867. However, when it gained independence, who held the power? The colonizers or the Indigenous peoples? In other areas of the world, like sub-Saharan Africa or South America, "independence" meant Indigenous peoples reclaiming governance & power after occupation from Europeans. In that sense, there was a clear line to be drawn between colonial & postcolonial eras. But in Canada (and the US and South Africa and Australia), power just shifted from Europe to the settlers. Indigenous peoples today still don't have autonomy over many of their governance structures, and they definitely don't hold power the same way that settlers & their descendants do.

So is Canada a postcolonial state? No. Is it a colonial state? Yes, but not in the sense that we're used to thinking about.

Alright, so knowing this, why should we be aware of whether Canada is a colonial or postcolonial state? Well, when we as settlers and the descendants of settlers are doing this decolonization work, we have to understand that we hold a lot of power. By decolonizing, our focus needs to be on shifting the power away from just us, and breaking down the immense structure of western frameworks and practices to include and amplify Indigenous voices, practices, and rights.

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Steps to Decolonizing the Classroom

Step One – Mindset

Rekindling the Sacred: Toward a Decolonizing Pedagogy in Higher Education (Shahjahan, Wagner & Wane, 2009) asks us to undertake the following:

- Emphasize in our teaching the importance of self, subjectivity and interdependence with others who form our community.
- Create a learning environment that begins by nurturing the inner self, the inner connections and allows space for personal development.
- Acknowledge and accept that there are multiple ways of knowing and theorizing equity issues, and to use these methods to make an inclusive curriculum and pedagogy.
- Allow for alternative epistemological viewpoints to be expressed and legitimized within the classroom.
- Promote a sense of compassion, respect, and understanding among all participants.
- Acknowledge humility in teaching and learning and accept the uncertainty and discomfort that arises within the classroom.
- Promote a language and embodiment of healing among students in anti-oppressive pedagogy.
- Recover a sense of sacredness in knowing, teaching, and learning.

As defined in *Cultures of Curriculum* (Joseph, 2010), several characteristics of the *Developing Self and Spirit* culture of curriculum are different than engineering's *First Principles* culture

of curriculum. This may make it difficult to synthesize spirituality in an engineering classroom.

Step Two – Learning

This entire course is your starting place for learning! Throughout, you'll learn more about facilitating discussions, understanding ways of knowing, applying systems thinking, and looking at specific parts of **First Nations** governance & land rights. All of these are crucial to your application of **decolonization** in the classroom.

You are always encouraged to seek out opportunities to learn more in order to commit to continuous, lifelong learning of this subject. Throughout this process don't be afraid to think critically, challenge your assumptions, and ask questions!

More learning resources are linked on the "Decolonization – Additional Resources" page.

Step Three – Action

We recognize that implementing **decolonization** in your classroom, even after you have the right mindset and knowledge, can be intimidating. Stefanie Marotta's *De-colonizing Classrooms* is a helpful place to begin.

Remember, we have to take a step back and assess our work culture and classroom environment before diving into the details of applying this to engineering. You can incorporate a decolonizing framework by (McGregor, 2012):

- Including content that illustrates the rights of **Indigenous**

peoples

- Creating opportunities to learn from the land or local community(ies)
- Inclusion of **elders** for instruction (and ensuring they are paid for their contributions)
- Using learning resources that do not perpetuate colonialism, colonial myths, or stereotypes
- Forming relationships with local Indigenous community members so that while they can give you suggestions of appropriate resources and/or materials, you can determine a way to give back to them and/or their community

Remember, we are not incorporating specific Indigenous practices into our teaching (that is **Indigenization**), but making *space* for them.

Exercise – Reflection on Teaching Practices

Ask yourself (UBC Equity & Inclusion Office, n.d.):

- What parts of my discipline and course curriculum are inherently colonial?
- Who are the learners in your class? What background do they have coming into this?
- How can I include multiple perspectives in my teaching?
- Is a territorial acknowledgment spoken in my classroom? If so, how often?
- How diverse are my approaches to pedagogy? How

can diverse cultures enrich or add to my approaches to pedagogy?
- Does my syllabus include a land acknowledgment?
- Is my classroom environment accessible? Am I flexible in my delivery style?
- Do students have a space to draw from their lived experiences in my classroom

Sources

Joseph, P.B. (Ed.). (2010). *Cultures of Curriculum (2nd ed.)*. Routledge. https://doi.org/10.4324/9780203837276

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in Teaching and Learning [Online course]. Canvas@UBC. Course URL: https://canvas.ubc.ca/courses/31444

Decolonizing Ourselves

So far we've looked at what **decolonization** is and what it looks like in the classroom. Well, what does it look like on a personal level? As mentioned earlier, decolonization of ourselves is the first step to decolonizing the classroom. There are two parts to this:

1. Recognizing our colonial tendencies.
2. Changing our behavior.

Recognizing our Colonial Tendencies

Listed below are a few items to consider when you catch yourself making an assumption (Equity & Inclusion Office, n.d.):

- Disrupt traditional thinking of "us/them", "White/other", binaries.
- Be aware of how we hear and interpret each other's narratives.
- Stay mindful of whose voices continue to be privileged.
- Remain cognizant of how to make connections between the global and the local.
- Recognize when our mind jumps to a stereotype regarding Indigenous peoples or decolonization and remind ourselves of the truth.

Changing Our Behavior

Once we catch ourselves making these assumptions and correct ourselves, we can begin to translate this into our actions. This could look like many things, including:

Exercises – Decolonizing Ourselves

- Actively seeking out & reading books written by non-European or Western authors.
- Researching the land you live on and the land you were born on in order to learn about the peoples who traditionally occupied/occupy that land.
- Talk to your friends and family about the decolonization work you're doing.
- Be able to explain to others why decolonization is important.
- Educate yourself on the history of colonialism, especially where you live (Canada, BC, etc.).
- Read the Truth & Reconciliation Calls to Actions (Links to an external site.)
- Read the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (Links to an external site.)

Additional Resources

If you have some time, you could also look at:

- Read the final report (or executive summary) of the National Inquiry into Missing & Murdered Indigenous Women and Girls (MMIWG)

Sources

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United Nations. (2007). *United Nations Declaration on the Rights of Indigenous Peoples*. Retrieved from https://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf

Special Topic - The UN and UNDRIP

The **United Nations** is an international organization composed of 193 countries, which attempts to maintain international peace and security, protect human rights, deliver humanitarian aid, promote international development, and uphold international law. They have offices all over the world, including the North American headquarters in New York City. Some of the more recognizable initiatives and documents they have put forth include **UNDRIP**, the Sustainable Development Goals, and the Paris and Kyoto agreements. Canada is a founding nation of the United Nations, and is involved in various UN missions.

However, what true power does the UN have over the Canadian government? Basically, nations have to follow International Law, but they are not required to follow resolutions. Resolutions and declarations are not something that *require* action. However, it looks bad for one or two nations if the rest of the world is abiding by a declaration. In that sense, is the UN a neocolonial body?

The term ***neocolonial*** refers to "relating to or characterized by the use of economic, political, cultural, or other pressures to control or influence other countries" (Oxford English Dictionary, 2022)

So in a way, yes. The UN can both assert direct and peer pressure on a country to follow international law or a declaration.

Examples of UN declarations include:

- UNDRIP
- The Declaration on Human Rights Education and Training
- The Declaration on Measures to Eliminate International Terrorism

While UNDRIP is a document that expresses the rights of Indigenous peoples worldwide, it was delivered through a neocolonial body. The UN currently does not recognize Indigenous Nations as sovereign nations, so they do not have a seat at the table.

We highly recommend reading through the declaration. It is useful to have on hand when teaching about decolonization and the rights of Indigenous peoples since it applies to people all over the world.

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Oxford English Dictionary. (2022). "neocolonialism, n." *OED Online*, Oxford University Press. Retrieved from www.oed.com/view/Entry/126019

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United Nations. (n.d.). *Our work.* https://www.un.org/en/our-work

Additional Resources & References

If you are interested in learning more about decolonization, we recommend exploring the following:

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WAYS OF KNOWING

Learning Objectives

Below, you can find the learning objectives for the Ways of Knowing instructor training:

- Define "way of knowing."
- Understand the strengths and limitations of the empirical way of knowing.
- Differentiate normative claims from prescriptive claims.
- Understand equity of ways of knowing and its relation to decolonization of engineering.

What is a "way of knowing?" Students, teachers and engineers are being asked to consider the Indigenous "way of knowing," which may sound foreign from the way in which engineers apply knowledge. What is being asked of engineers when considering Indigenous ways of knowing? What should be done about conflicting worldviews in engineering projects? These questions will be answered in the subsequent training module.

Defining Ways of Knowing

A UBC Teaching and Learning Media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=701

Watch this Training Video on "Defining Ways of Knowing." Download the audio podcast of this video [Download Link].

Ways of Knowing

A "**way of knowing**" is a tool used to acquire knowledge. These tools include:

- Language
- Sense perception
- Emotion
- Reason
- Imagination
- Intuition
- Memory
- Faith

There is no "perfect" method to acquire knowledge. Some people prioritize a way of knowing based on what is considered useful to society or to themselves.

In summary:

questions → **ways of knowing** → knowledge claim

Questions	**Way of Knowing**	**Knowledge**
What colour is the grass?	Sense perception: Observation	The grass is green.
Why do I buy cool treats for my cat?	Emotion	I love my cat.

Sources

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Resource: Polarity Mapping. (2017, May 27). University Innovation Fellows. Retrieved from https://universityinnovation.org/wiki/Resource:Polarity_Mapping

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The Difference Between What We Know & Ways of Knowing

To clarify the difference between what we know and ways of knowing: what we know is what we have taken to be true. For example, "the grass is green" or "I love my cat" are things that I know. How I came about that knowledge is a way of knowing. I know the grass is green based on observation. I know that I love my cat based on the emotions I feel when I interact with him.

The **empirical** method of knowing: consists of observing, experimenting, replicating and hypothesizing to acquire objective knowledge about the natural world.

Primary "**ways of knowing**:" sense perception + reason

We value **empirical** knowledge because there are several steps involved to ensure the data collected is unbiased, accurate and precise. Some of these steps include; peer review and designing a clear research method that anyone can recreate to achieve specific results.

The **empirical** method of knowing supposes that the way that we gain knowledge is primarily by sensory experience. Although this may seem to be self-evident to those who have been scientifically trained, this is a relatively new feature of human thinking that was only explicitly formulated three centuries ago by John Locke (Uzgalis, 2022). The **empirical** method is especially useful for creating and distributing knowledge systems (e.g. sciences) that delineate the specific properties of the natural world.

In 2015, the Laser Interferometer Gravitational-Wave Observatory

(LIGO) detected a cataclysmic cosmic event. Two black holes with 30 times the mass of the sun had collided in the distant universe. This collision caused detectable ripples in spacetime, which were independently observed at the LIGO observatories in Livingston, Louisiana and Hanford, Washington in the United states. This observation aligned with a theory postulated 100 years ago by Einstein that gravitational waves exist (LIGO, 2016). The **empirical** evidence is strong: the "fingerprints" that are left behind by the collision were measured in Livingston and Hanford, and they are nearly identical when superimposed. Astrophysicists can now confidently declare that gravitational waves exist, thanks to empiricism and the scientific way of knowing, or method. Framing the truth to be what is observable is a powerful tool for understanding the physical world.

Limitations of the Empirical Method

Science does not provide a framework for making value judgments. Scottish historian and philosopher David Hume noted the difference between **descriptive** and **prescriptive** statements (Cohon, 2018):

Descriptive statements can be directly observed
Prescriptive statements describe what will happen

There is a significant difference between what can be observed and what ought to happen. While making predictions/hypotheses (**prescriptive** statements) they must be justified with **observable** evidence (descriptive statements).

Consider this statement: "Our human ancestors ate the meat of domesticated and wild animals, so vegetarians should really be eating meat."

Statement	Statement Type	Assumptions?
Our human ancestors ate the meat of domesticated and wild animals.	Descriptive	No assumptions, a statement based on historical evidence.
Vegetarians should really be eating meat.	Prescriptive	Assumes that what is "appropriate" is more important than a vegetarian's choice to abstain from meat. This statement on values pertains to ethics and cannot be inferred by scientific observation.

Questions whose answers fall partially or fully outside the realm of science have far-reaching implications in the ways we structure societies. Engineers are entrusted to make decisions on behalf of populations with highly variable values and belief systems. If engineers are to suit the project to the user or group of users, we must understand what other ways the users have come to understand existence. Our designs better serve people when we accept different **ways of knowing** as being valid.

Sources

Cohon, R. (2018). Hume's Moral Philosophy: Is and Ought. In *Stanford Encyclopedia of Philosophy*. Retrieved from https://plato.stanford.edu/entries/hume-moral/#io

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ligo20160211?highlight=black%20hole%20ripples%20in%20space time

Uzgalis, W. (2022). John Locke. In *Stanford Encyclopedia of Philosophy*. Retrieved from https://plato.stanford.edu/entries/locke/

Ways of Knowing, Equity, and Synthesis

Engineering culture values reason, progress and rationality. The fast-paced technological environment that we work in requires a keen understanding of the **empirical** ideas and **ways of knowing** that don't align with traditional methods of acquiring knowledge in engineering are often ignored. To treat different **ways of knowing** equitably, we need to consider different sources of the truth and of value as both real and consequential.

Consider the way we view time. Some people visualize time as a linear concept. Others view time as a cycle. One way to synthesize these concepts visually would be to depict time as a cyclical roller coaster:

FIG 1 – Cyclical Roller Coaster

Let's look at another example. Consider a rock. Is a rock alive?

According to **empirical** knowledge, a living thing:

- Eats
- Breathes
- Reproduces
- Grows
- Poops
- Responds to the environment (sweats in the heat, shivers in the cold, etc.)

Based on observation, a rock doesn't do any of these things, so according to the **empirical** way of knowing, a rock is not alive! Let's say there is a body of knowledge, though, that says everything on Earth is alive, including rocks, water, and wind. According to this body of knowledge, the rock is alive.

So, is the rock really alive? Well, in the **empirical** definition, no! But the other **way of knowing** cannot be disregarded or disrespected. So according to that **way of knowing**, the rock is alive! To consider different ways of knowing equitably, you must acknowledge that spiritual or emotional justification, not just the **empirical**, is valid & valuable.

Equity & Design

To design equitably, we must synthesize the **ways of knowing** of all collaborators participating in a design project. Let's consider an example of this.

Examples – Client and Engineer Perspective of Designing a Hockey Stick

Say you work for a sportswear manufacturing company, which specialized in items such as hockey and lacrosse sticks. Your manager has recently asked you to liaise with a prominent Canucks player to try and sell a custom hockey stick to him.

You have a background in materials engineering. Therefore, you are well versed in what range of elastic modulus,

toughness, and strength is required of the materials you use when manufacturing the hockey sticks. You understand that the density of the material is important, and you tend to stick to density standards set out by your company. You know that you can absolutely sell a good stick to your client as long as the client can describe the technical specifications of his favorite stick(s). You set up a meeting with your client and are shocked when he describes what he needs.

Client: It can't be too heavy since I focus on quick stick work. it needs to have some "give" but stiff for pokes. I need an extension of my body, not deadweight. It's got to be balanced, it can't have a bunch of extra weight in weird spots, otherwise I can't get a fast shot off. The blade needs to be curved but not too much. It also needs to have some flex for the slap shots.

Is your way of knowing what goes into the perfect hockey stick flawed? Is your client's? No! You both use observation and testing to determine the best hockey stick – you just need a way to translate between the ways of knowing to benefit both you and your client.

Media Attributions

- Cyclical Roller Coaster © Pete Ostafichuk is licensed under a CC BY (Attribution) license

SYSTEMS THINKING

Learning Objectives

Below, you can find the learning objectives for the Systems Thinking instructor training:

- Recognize & understand the 3 relevant types of systems that engineers encounter
- Understand what a complex system looks like in a real world context

Systems Thinking

A UBC Teaching and Learning Media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=703

Watch this Training Video on "Systems Thinking." Download the audio podcast of this video [Download Link].

What is Systems Thinking?

Systems thinking is a crucial concept to understand before engaging with Indigenous communities, but even if you aren't working with Indigenous communities, it is important for all engineers to be somewhat familiar with the topic. There are three types of systems we are likely to encounter as engineers: Simple, Complicated, and Complex. (Blignaut, 2019)

Simple systems have known knowns (AKA all the variables are known), so they are solvable. For example, the equation of a line with a known x or y value is solvable. The cause and effects in this system are clear.

Complicated systems have known unknowns, like a large system of equations that can be only solved with a matrix. In this case, the cause & effect relationships are separated by space & time. You can utilize systems thinking to solve these systems.

Lastly, there are **complex systems**. **Complex systems** have unknown unknowns, so you don't know the framework or the variables. The cause & effect relationships aren't repeated, and the system is only coherent in retrospect.

For example, your household is a **simple** system. There's you, maybe a spouse, maybe kids or elders that depend on you, and maybe a pet. You can easily map that system in terms of who is related to who. However, what if you try to map your entire family tree? Who do you include? Your parents, your cousins? Your in-laws? What about your cousins' spouses and their parents? Or your child's spouse? Do you

define family by blood, the law, something else, or a combination? That system is **complicated**.

Sources

Blignaut, S. (2019, August 19). 7 Differences between complex and complicated [blog post]. *Noteworthy*. Retrieved from https://blog.usejournal.com/7-differences-between-complex-and-complicated-fa44e0844606

Mindtools. (2016). The Cynefin Framework. *Mindtools*. Retrieved from https://www.mindtools.com/pages/article/cynefin-framework.htm

Poli, R. (2013). A Note on the Difference Between Complicated and Complex Social Systems. *Cadmus Journal*, 142-147. Retrieved from https://www.cadmusjournal.org/files/pdfreprints/vol2issue1/reprint-cj-v2-i1-complex-vs-complicated-systems-rpoli.pdf

Additional Reading

If you are interested in exploring complex systems in the engineering context, take a look at these resources:

Ottino, J.M. (2004). Engineering complex systems. *Nature*, 427, p. 399. Available at https://www.nico.northwestern.edu/documents/engineering-complex-systems.pdf

Sheard, S.A. and Mostashari, A. (2009), Principles of complex

systems for systems engineering. *Syst. Engin.*, 12: 295-311. DOI: 10.1002/sys.20124.

Below are some civil engineering specific resources on complex systems:

Bertelsen, Sven & Sven. (2003). Construction as a Complex System [conference proceedings]. *Proceedings for the 11th Annual Conference of the International Group for Lean Construction*. Retrieved from https://www.researchgate.net/publication/236841812_Construction_as_a_Complex_System

Ellinas, C. (2019) Perspective: organisations as complex systems. *Civil Engineering and Environmental Systems*, 35(1-4), pp. 1-5. DOI: 10.1080/10286608.2019.1615472

Complex Systems

A **complex system** is hard to map. These systems involve many variables, and many of those variables are dependent on one another. You cannot control the outcome of a complex, systematic problem. However, you can learn the nuances of the system & understand outcomes retroactively. In these cases, the whole of the system is greater than the sum of its parts.

Some examples of **complex systems** and problems include: weather predictions, racism, or tracking a virus (epidemiology).

How are Intercultural/Inter-organizational Collaborations Complex?

So as an engineer, how should you think about systems? How often do you interact with **complex systems**?

If you work in construction, infrastructure planning, natural resources, or a similar field, you probably collaborate with organizations or communities with different values, goals, motives, and structure. Cross-culture or cross-organizational collaborations are complex because they involve a reliance on people, and people are complex. When you or your organization enters a collaboration, you are met with unknown unknowns. Until the project is complete, you won't be able to track the effects of a decision since the outcome of a decision relies on numerous moving parts.

For example, let's say you are working with a community (Town A) to build a new bridge to replace an old one that is in disrepair. You have the plans ready to travel to the community to start the project when your point of contact in Town A steps down due to personal reasons.

Assume no one in the local government has the time or ability to take over the role completely, so you now have multiple points of contact who can't dedicate 100% of their time to the bridge. What would you need to do? Well, probably reassess the situation to best work with what you have. You won't know the true effect of any decision made in this scenario until after the process is complete. This is part of the complexity of the system.

Take a moment to reflect on other ways in which collaborative projects are complex.

FACILITATING DIFFICULT DISCUSSIONS

Learning Objectives

Below, you can find the learning objectives for the Facilitating Difficult Discussions instructor training:

- Articulate what can make conversations difficult.
- Reflect on how one responds to conflict and develop greater self-awareness.
- Evaluate a diversity of techniques and strategies to assist in successfully navigating challenging situations in the learning environment.
- Anticipate circumstances that could lead to a difficult conversation and prepare a plan of action for handling difficult conversations effectively.

Approaching "Difficult" Conversations

Difficult conversations are an inescapable part of higher education. You can expect to find diverse experiences, interests, and knowledge in any classroom. These all add to the richness of the learning experience. In the engineering classroom, we run into these difficult conversations less often. However, we must be equipped to facilitate them when they occur.

As instructors, we can anticipate difficult conversations in our learning environments and strategically utilize these as teachable moments. Often it is the role of the instructor to guide students in exploring emotionally charged issues, but leading these discussions is a perennial challenge.

Part of the difficulty lies in the fact that we never fully know which issues will be “hot buttons” for our students.

When learning how to respond in these challenging moments, being aware of your own identity as an instructor is critical, a topic that will be explored further in this module. Knowing your values, beliefs, assumptions, and privileges can help you respond to difficult conversations.

> **“**Know yourself. Know your biases, know what will push your buttons and what will cause your mind to stop. All of us have areas in which we are vulnerable to strong feelings. Knowing what those areas are in advance can diminish the element of surprise. This self-knowledge can enable you to devise in advance strategies for managing yourself and the class when such a moment arises. You will have thought about what you need to do to enable your mind to work again” (Warren, 2017).

In other instances, there are topics that instantly and predictably engender strong and opposing feelings. We understand these types of topics to be "supercharged" in that they are reliably controversial and require careful preparation to approach them in discussions responsibly and effectively.

Both hot button moments and supercharged topics can be helped by preparing and laying the groundwork for effective and productive classroom discussions.

Remember, you probably won't be an expert when facilitating these challenging discussions, and that is okay!

Using the tips throughout this module should help you feel more confident in facilitation.

Sources

The content on this page is adapted from the following resources:

Centre for Teaching. (n.d.) Difficult dialogues. *Vanderbilt University*. Retrieved from https://cft.vanderbilt.edu/guides-sub-pages/difficult-dialogues/

CNDLS. (n.d.). Difficult discussions. *Georgetown University*. Retrieved from https://cndls.georgetown.edu/difficult-discussions/

Warren, L. (2017). Managing Hot Moments. *Derek Bok Center for Teaching and Learning*, Harvard University. Retrieved from https://eloncdn.blob.core.windows.net/eu3/sites/126/2017/04/Managing-Hot-Moments-in-the-Classroom-Harvard_University.pdf

UBC Equity & Inclusion Office. (n.d.). *Equity, Diversity & Inclusion in Teaching and Learning* [Online course]. Canvas@UBC. Course URL: https://canvas.ubc.ca/courses/31444

Adaption

This section has been adapted from the "Navigating Difficult Conversations" module of the open canvas course, Equity, Diversity & Inclusion in Teaching and Learning. Some of the content has been tailored to the engineering context.

Reflection Before Discussion

Planning a Discussion

Before leading class discussions, instructors should begin by considering the learning outcomes for students. What do you hope students will learn during the discussion? Is the focus on course content, skills, dispositions, or all three? What strategies do you look to use to extend students' thinking and encourage critical analysis and broaden student perspectives?

Exercises – Strategies to Prepare for Difficult Discussions

Before the conversation:

- Think about what you hope students will gain from the discussion.
- Make intellectual exploration, not judgment or consensus, a goal for class discussions.
- Frame the conversation with prompts and questions.
- Consider how to reply to incomplete or inaccurate responses or when student views are at odds with prevailing perspectives.
- "Name and Frame" is the way you will address "hot button" topics when they arise.
    - "Name" the challenge, and then "frame" your approach by describing your expectations for

how students can disagree and respectfully share alternative viewpoints.

- Teach students the skills they need to participate in difficult conversations

Supercharged Subjects

While some topics can suddenly and unexpectedly generate heated discussions and hot button moments, others are likely to cause heated discussions every time. These are known as "supercharged subjects." Talking about decolonization, anti-Indigenous racism and classism, or Indigenous land rights are a few topics that can be supercharged.

Exercises – Strategies for Planning and Implementing Course Content Involving Difficult Discussions

Below are some strategies for planning a course or module that facilitates quality discussion and thoughtful debate, mainly when the subject is divisive or emotionally charged.

Begin to shape the terms of debate long before the controversial issue arises in class.

- As a class, consider reviewing different perspectives and underlying knowledge bases forming major arguments around the topic.

Define the kinds of mental operations required to deal effectively with the controversial issue.

- Layout the possible assumptions behind specific arguments, unpack popular attitudes around them, and what these may convey.

Systematically model the operations and roles students will need to encounter the controversial subject successfully.

- Consider ways in which people might respectfully disagree about or expand upon a topic ("I wonder if you have considered this from the perspective of...")

Provide students with experiences of seeing a question from multiple perspectives.

- Offer multiple critiques or discussions of the topic from very different viewpoints and angles.

Give students practice at contextualizing controversial issues.

- Discuss the cultural, contextual, historical, and social contexts surrounding the issues.

Approach the controversial issue incrementally:

- Step 1. Have students define the terms in which the issue has been faced in the past.
- Step 2. Have students evaluate the validity of criteria that have been used to discuss the issue

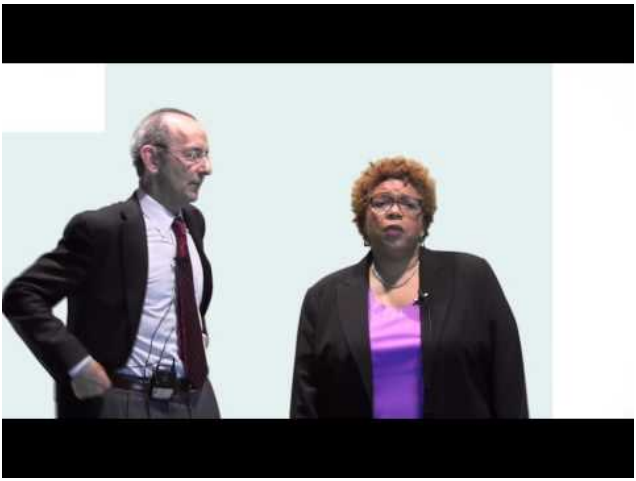
- Step 3. Have students widen the range of possible positions.
- Step 4. Then have students contemplate their responses.

Interrupt the discussion to make points of disagreement explicit and observe them together.

- "Let's pause here and consider what central disagreements and sticking points we can observe."

Despite the structure, make sure the discussion belongs to the students, and be prepared to take advantage of student input at every stage.

Facilitating a Tough Discussion



A YouTube element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=229

Watch the "Navigating Difficult Conversations" video aimed to guide you through navigating difficult conversations.

Sources

Center for Teaching, Research & Learning (CTRL). (n.d.). Facilitating class discussions and navigating difficult conversations. *American University*. Retrieved from https://edspace.american.edu/ctrl/portfolio-item/facilitating-class-discussions/

Pace, D. (2003). Controlled Fission: Teaching Supercharged Subjects. *College Teaching*, 51(2), pp. 42–45. Retrieved from http://www.jstor.org/stable/27559130

During the Discussion

Classroom conversations surrounding **First Nations** land rights, racism & classism, and marginalized groups can be tricky to navigate. There is a need to educate and listen, especially to the marginalized voices in question. There is a need to be thorough without being harsh. There is a need to hold space for individuals in the room who may have relevant lived experience (in this case, Indigenous folks) without putting them on the spot.

Keep in Mind

Here are some things to keep in mind as you navigate these discussions:

Validate Any Discussion of Feelings

Due to the objective nature of engineering, feelings are rarely discussed or acknowledged in a classroom environment. This isn't because engineering students and professors aren't capable of emotions, but because there is no need to discuss our feelings when calculating fuel rations and integrals and load-bearing capacity. Therefore, we don't have the practice of listening to others' feelings when it comes to classroom learning.

- Recognize that students may be in unfamiliar territory regarding discussing feelings/emotions/lived experiences in the classroom
- Acknowledge in the beginning that strong emotions are okay and it's alright to express them.

- Be receptive to students' emotions
- Don't be afraid to recognize and name racial or cultural tension
- Encourage participants to talk about their anxieties/anger regarding the topic

Encourage Diverse Perspectives & Curiosity on a Topic

When students do share, we must recognize it.

- When someone speaks from personal experience or shares their feelings, thank them and acknowledge them for it
- Thank & acknowledge the whole class for participating in a challenging discussion at the end

Control the Discussion Process, Not Content

- This is explained well in the video in section 2.2.
- When students make challenging or angry statements, give yourself and the students time to reflect before responding.

Things to Avoid

Here are some things to avoid doing during complex discussions:

Do Nothing

- Don't opt for silence if/when discussions get heated
- Don't avoid the conversation

Sidetrack the Conversation

Appease the Participants

- Don't avoid confrontation
- Don't allow the conversation to be sidetracked
- Don't glaze over the more profound, personal meaning behind comments

Terminate Discussion When It Gets Hard

Become Defensive

- You can be more present and involved in the discussion by avoiding these things.

Sources

Center for Teaching, Research & Learning (CTRL). (n.d.). Facilitating class discussions and navigating difficult conversations. *American*

University. Retrieved from https://edspace.american.edu/ctrl/portfolio-item/facilitating-class-discussions/

Wing Sue, D. (2015). Facilitating difficult race discussions. *Wiley*. Available at https://www.colorado.edu/center/teaching-learning/sites/default/files/attached-files/facilitating_difficult_race_discussions.pdf

Hot Button Moments

One aspect of difficult conversations is their potential to generate "**hot button moments**," instances where people's feelings rise (sometimes unexpectedly) to the point that threatens teaching and learning. This can occur during the discussion of issues people feel deeply about or result from classroom dynamics in any field.

While **hot button moments** may appear challenging at first, with the right tools, they can be rich and productive learning opportunities.

Exercises – Hot Button Moment Reflection

Which **hot button moments** have you experienced?

Think of a time during your teaching when you were effective or ineffective in responding to a **hot button moment**.

How did you feel? What did you do? Why do you think that you were effective or not effective?

Some examples of common "hot buttons" occur in these forms:

Microaggressions

Microaggressions are brief and commonplace daily verbal,

behavioural, and environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial, gender, sexual orientation, and religious slights and insults to the target person or group (Sue, Capodilupo, et al., 2007). For more information on **microaggressions** in the classroom, please refer to the UBC Wiki.

Personalization of a Comment

Remarks are used or interpreted as personal attacks. These comments are directed at a particular person based on someone's initial feelings and thoughts, which are often poorly articulated and conceived.

Generalization

Remarks articulated as grand sweeping statements. The most common type of "hot button" generalizations are stereotypes. Stereotypes generalize members of different groups and often involve a flawed group representation.

To see some of the effects of **microaggressions**, watch the video below to hear students talk about **microaggressions** they have experienced in the classroom.

A YouTube element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=235

Watch this video "SNIPPET: Microagressions in the Classroom" from YouTube

Sources

Bohmer, S. K. (1989). Resistance to Generalizations in the Classroom. *Feminist Teacher*, 4(2/3), pp. 53–56. http://www.jstor.org/stable/40545548

Warren, L. (2017). Managing Hot Moments. *Derek Bok Center for Teaching and Learning*, Harvard University. Retrieved from https://eloncdn.blob.core.windows.net/eu3/sites/126/2017/04/Managing-Hot-Moments-in-the-Classroom-Harvard_University.pdf

Strategies for Hot Button Moments

Several different strategies can transform challenging hot button moments into rich and productive learning moments. The key is finding which one will work best for your particular context. Here are two strategies that can be used to address Hot Button moments.

Strategy 1 – Suggestions

Below are suggestions for addressing hot button moments in the classroom and, in particular, how to facilitate classroom discussions around potentially difficult issues (CELT, n.d.; CRLT, 2020).

Exercises – Navigating a Hot Button Moment in the Classroom

- Take a moment count to ten before speaking or reacting.
- Understand your positionality about the issue.
- Decide if you will come back to it in the moment; mark it as something the class will come back to at the next meeting.
- Revisit or establish discussion guidelines.
- Invite students to move around the room, write or

sketch quietly, or take a few deep breaths to change the energy in the room before diving back in.
- Find a way to connect the hot moment to course topics or learning goals.
- When appropriate, seek to clarify and name students' comments that have sparked tension.
- Try to depersonalize positions of disagreement that have emerged in the learning environment.
- Teach students the skills they need to participate in difficult conversations.
- Identify University Resources.
- When there has been a hot button moment – encourage self-reflection at the end of class. Give people a chance to decompress.
- Consider connecting with trusted colleagues or friends.

Strategy 2 – Straight A's Model

Another strategy to facilitate hot button moments is Diane J. Goodman's "Straight A's Model" (2015). This model outlines an effective way of addressing those sudden hot button moments in the classroom:

Exercises – Straight A's Model of Navigating a Hot Button Moment

AFFIRM – Affirm and appreciate people's comments and questions.

- Thank you for asking that question. I'm sure others were wondering about that too.
- Interesting point. Let's consider that.
- I appreciate that you raised that point.
- I appreciate your willingness to stay open and consider other perspectives.
- I know this isn't easy to think or talk about. Thank you for raising that point.

ACKNOWLEDGE – Acknowledge what people are saying. Make sure you understand what they're expressing. Paraphrase their words and feelings.

- I'm hearing you say that… Is that correct?
- It sounds like you feel….
- So from your perspective…
- It seems like you're both concerned about….even though you're approaching it differently.
- Those are both excellent examples of the effects of racism because….

ASK – Ask questions to better understand individuals' behaviors and perspectives and to help them reflect on their views.

- Can you tell me more about how you came to think that?
- What experiences led you to that belief?
- How would you make sense of…?
- What would it mean for you if this was true….?
- How were you feeling when…?

ADD – Add more information, historical/social/political context, or alternative explanations. Challenge misinformation, broaden people's perspectives, address differences in power and privilege, and put issues in a larger context.

- It is interesting you think that, I was taught…
- This reminds me of a story I was told as a child…
- This research study found that…
- Let's consider how the history of….may have contributed to what we see today.
- How might people's social identities affect their experiences in this situation?
- What are some other explanations for this?

Sources

Center for the Enhancement of Learning and Teaching (CELT). (n.d.). *Navigating Hot-Button Campus Issues in the Classroom* [handout]. Tufts University. Available at https://provost.tufts.edu/celt/files/navigating-hot-button-campus-issues-in-the-classroom.pdf

Goodman, D.J. (2015). *Straight A's Model* [Canvas module]. Canvas@UBC. Course module URL: https://canvas.ubc.ca/courses/31444/pages/3-dot-2-strategies-for-hot-button-moments-part-2?module_item_id=1523740

University of Michigan Center for Research on Learning and Teaching (CRLT). (2020). *Making the Most of "Hot Moments" in the Classroom* [handout]. University of Michigan. Available

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Brave Spaces

One way in which some instructors aim to create more inclusive classrooms is by describing a classroom as a "**Safe Space**." This description implies that danger, risk, or harm will not occur in the classroom. To claim we can create "**safe spaces**" is therefore misleading and possibly even counterproductive because it promises to protect and exempt people from the very difficulties and challenges that real learning and growth require.

As an alternative, "**Brave Spaces**" shift away from the concept of safety and emphasize the importance of bravery instead, to help students better understand—and rise to—the challenges of genuine dialogue on diversity and social justice issues. "[U]sing "brave" rather than "safe" not only sets a tone for engagement but also proposes a mode of engagement." (Cook-Sather, 1) Painful or difficult experiences in "**brave spaces**" are acknowledged and supported, not avoided or eliminated. "[C]reating **brave spaces** [can] challenge the implicit and explicit ways in which inclusion and exclusion, affirmation and disenfranchisement, and belonging and alienation play out for people with different identities." (Cook-Sather, 2).

Here are some suggested principles to help create brave spaces:

Controversy with Civility

Conflict is a natural outcome in a diverse group. Continued engagement through conflict is essential, and such activity strengthens rather than weakens diverse communities.

Own Both Your Intentions and Your Impact

Intentions and impact matter. The impact of our actions is not always congruent with our intentions, and positive or neutral intentions do not trump negative implications.

Challenge by Choice

It is about more than simply affirming challenge by choice as a ground-rule. It is also necessary to actively encourage participants to be aware of what factors influence their decisions about whether to challenge themselves on a given issue. It is important to ask participants to think about what keeps them from challenging themselves. And to encourage participants to be especially attentive to the degree to which their agent group memberships inform their decision about whether and how deeply to engage in a challenging activity or dialogue.

Respect

It is essential to spend time discussing respect. To support them in maintaining increased mindfulness of the different ways they can demonstrate respectfulness to one another, ask: How does someone demonstrate respect for you? Delving into this question can reveal various cultural understandings of the term and mitigate participants' assumptions about what kinds of behaviours are respectful. Discussing ways to firmly and respectfully challenge others and how to respond when being firmly and respectfully challenged is a fruitful investment of time that can prevent students from automatically experiencing and interpreting challenges from others as acts of disrespect.

No Attacks

Have clarifying conversations to describe the differences between a personal attack on an individual and a challenge to an individual's idea, belief, or statement that makes an individual feel uncomfortable. Pointed challenges are not necessarily attacks, but the uncomfortable experience that may result can sometimes lead to a defensive reaction.

Source

From safe spaces to brave spaces: A new way to frame dialogue around diversity and social justice by Brian Arao and Kristi Clemens (in The Art of Effective Facilitation: Reflections From Social Justice Educators).

Adaption

Adapted from:

Arao, B. & Clemens, K. (2013). From safe spaces to brave spaces: A new way to frame dialogue around diversity and social justice. In Landreman, L.M. (Ed), *The Art of Effective Facilitation: Reflections From Social Justice Educators*, pp. 135-150. Stylus Publishing, LLC. Available at https://tlss.uottawa.ca/site/perspective-autochtone/1d-_From-Safe-Spaces-to-Brave-Spaces.pdf

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LAND AND TITLE RIGHTS

Learning Objectives

Below, you can find the learning objectives for the Land and Title Rights instructor training:

- Consider critically the history of the land you occupy or the land your teachings are centred around.
- Understand the themes of Land Use rights, Title Rights, and Sovereignty rights.
- Apply knowledge of land & title rights to regions and communities outside of BC and Canada.

Indigenous Land and Title Rights

A UBC Teaching and Learning Media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=247

Watch this Training Video on "Land & Title Rights." Download the audio podcast of this video [Download Link].

Land and Title rights is an enormous topic that we don't expect you to become experts on. However, we will go over some of the basics because land theft is directly at the center of colonization. Today, the land use consultation process is part of a large, bureaucratic institution (the federal & provincial governments) that doesn't have the ultimate goal of benefiting Indigenous peoples.

Considering the Land

In the Nikki Sanchez Ted Talk that you were asked to watch in the first lesson (Decolonization), she asks us whose land our grandmothers were born on. Have you thought about it? Can you answer the question? There are two predominant ways to consider this question: Was your grandmother born on her traditional lands, or was she born a settler?

So why should we think about the land? Why is it essential to recognize whose traditional lands you are occupying? As we talked about in the decolonization lesson, places like Canada, Australia, New Zealand, and the US are full of settlers on essentially stolen and/or unceded land. Unceded refers to land occupied by settlers without treaty negotiations taking place. While Indigenous peoples still live in what is known as "Canada," they do not necessarily enjoy the same rights and title to the land that they did prior to colonization. This lesson will cover Indigenous land claims (or titles) and explore how the current government structures in "Canada" interact with Indigenous land rights.

Land Acknowledgements

Let's say you're not Indigenous to the land you are occupying right now. If you are in Vancouver, the lands in this region are claimed as traditional by the Musqueam, Squamish, Tsleil-Waututh, and other Coast Salish nations. The land is not only tradition, but it is ancestral, meaning the land was handed down from generation to generation. Lastly, the land in Vancouver is unceded, which means that the land was never handed over to the federal or provincial government, and no treaties were signed.

When giving a land acknowledgement, it is crucial to mention if the land is unceded, traditional, and/or ancestral and reflect on how your presence on that land contributes to colonization and violence against Indigenous peoples.

Here is an example of a land acknowledgement used widely at UBC: "I would like to acknowledge that we are gathered today on the ***traditional, ancestral***, and ***unceded*** territory of the Musqueam people."

Themes of Indigenous Land and Title Rights

In Canada, Indigenous rights, including land rights, stem from a few sources, including inherent, pre-existing rights, the Royal Proclamation of 1763, and Section 35 of the Constitution Act. These Indigenous rights include (but are not limited to):

Examples

- Aboriginal title (ownership rights to land).
- Rights to occupy and use lands and resources, such as hunting and fishing rights, which have been interpreted by the courts to be cultural rights.
- Self-government rights.

We acknowledge that land rights are not all-encompassing of Indigenous rights, and though our focus in this training is purely on land & title rights, we must recognize the broad spectrum of inherent, Indigenous rights that exist. For more information, please see the UN Declaration on the Rights of Indigenous People (Links to an external site.).

Note that in this presentation, we will be using the term "Aboriginal" as interchangeable with "Indigenous". While this term is recognized to be outdated in many current contexts, "aboriginal" is the legal term used in some of the policies and/or practices that will be cited.

Theme 1 – Aboriginal Title

Under property law, "title" refers to "legal basis of the ***ownership*** of property, encompassing real and Personal Property and intangible and tangible interests therein" (title, 2008). Aboriginal title refers to "the inherent Aboriginal ***right*** to land or a territory" (Hanson, Aboriginal Title, 2009). There is a disconnect between the "Canadian" or European concept of title and the way various Indigenous groups from all over Turtle island view the concept of title (Hanson, Aboriginal Title, 2009). In the eyes of the colonizers, "title" refers to ownership of a piece of land. However, Indigenous peoples in "Canada" may view "title" as not only being allowed to

exist on an area of land, but having stewardship of that land. Due to this disconnect, some Indigenous communities in Canada refuse to enter the treaty or title negotiation process because it means accepting a Canadian legal concept that is antithetical to their way of knowing.

In Canada, Indigenous peoples have a *sui generis* claim to land, which means that the Canadian government acknowledges that Indigenous peoples have a right to their lands as a result of long occupation and pre-existing relationship with their home territories. The right was not *given*, but exists nonetheless. Historic treaties and the modern day treaty process (Comprehensive Land Claims) seek to address Aboriginal title.

Theme 2 – Right to Use & Occupy the Land

Indigenous peoples have the right to use and occupy their land. Under Article 26 of the United Nations Declaration on the Rights of Indigenous Peoples (Links to an external site.) (**UNDRIP**):

1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.
2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired.
3. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due respect to the customs, traditions and land tenure systems of the Indigenous peoples concerned.

Indigenous peoples also have the right to not be forcibly removed from their lands under Article 10. (Links to an external site.)

The Canadian government did not sign onto UNDRIP initially (it was accepted by the UN General Assembly in 2007), but in 2010, it pledged support to the document (Hanson, UN Declaration on the Rights of Indigenous Peoples, 2009). While the government has pledged its support to the document, there are doubts from First Nations that the government's commitment is actually one of action.

Theme 3 – Right to Self-Government

The right to self-government is also outlined in UNDRIP in Article 4 (Links to an external site.):

> Indigenous peoples, in exercising their right to self-determination, have the right to autonomy or self-government in matters relating to their internal and local affairs, as well as ways and means for financing their autonomous functions.

Self-governance is something that First Nations may bargain for during the modern treaty process, but is not given by virtue of entering the treaty process. If you are interested in learning more about treaties please see the Supplementary Materials.

Global Themes in Indigenous Land & Title Rights

Now let's think a bit more broadly about land and title rights. On a global scale, the UN Declaration on the Rights of Indigenous peoples is the framework in place worldwide, and no matter where you

go, this is the international standard. However, there are a few countries that either abstained from supporting UNDRIP, or accepted it and then denied that there are Indigenous peoples in their country.

As of 2020, the countries that have not pledged support for UNDRIP are: Azerbaijan, Bangladesh, Bhutan, Burundi, Colombia, Georgia, Kenya, Nigeria, Russian Federation, and Samoa. Also, 10 Pacific Island states were absent during voting, so it is unclear whether or not they support UNDRIP. These 10 states are: Fiji, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

In addition to the nations above, your students may end up working in a country that agreed to UNDRIP but does not recognize anyone in their country as Indigenous, like China, who does not recognize Tibetans, Uyghurs, and Mongols as Indigenous (Davis, 2014).

Conclusion

You have now completed all of the instructor trainings. Congratulations! You are now equipped with knowledge, tools, and resources to help you implement Modules 1 – 3 into your classroom. Remember, you can always refer back to these materials.

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Additional Resources

If you are interested in learning more about Indigenous land and title rights, you can find some additional case studies, examples, and readings below.

Court Cases

The way Indigenous land rights are framed today is largely due to a number of precedent-setting court cases. Before diving into the details of land & title rights in BC and Canada, let's explore the impacts of some of these cases.

R v Calder (1973) – Canada *Theme 1*

- This case marked the first time that the Canadian courts recognized that aboriginal title to land *had* existed. While the court did not explicitly say whether or not Indigenous peoples still have a right to their traditional land(s), it was a major milestone in recognizing the Indigenous title right.

R v Guerin (1984) – Canada *Theme 2*

- This case ruled that aboriginal title was a *sui generis* right. This means that Indigenous Nations have a unique collective right to the use of their ancestral territories.

Delgamuukw vs British Columbia (1997) – Canada & BC *Theme 1*

- This case set a precedent by allowing oral testimony as proof of historical land claims. It was also the first time that the court explicitly said that "aboriginal title is a right to the land itself."

T̂silhqot'in vs British Columbia (2014) – Canada & BC *Theme 1/3*

- This was the first time that the court ruled a first nation held title to land outside of a reserve. The court also confirmed that because the T̂silhqot'in have title to the land, they have the right to manage the land according to their laws and governance structures.

It is important to recognize that, as shown by these court cases, aboriginal title right is not something the Canadian government is eager to recognize beyond the titles that exist on reserves. In fact, the government has been hesitant to recognize aboriginal title out of uncertainty for what it means for the nation. Currently, the apparent move is toward the "recognition framework" (Government of Canada, 2018). There is a large degree of uncertainty about what it would look like to recognize all aboriginal titles, so the government has, for the most part, left it up to the courts to decide.

Treaties

Treaties (both modern and historical) define the way that the

Canadian government views the rights of Indigenous peoples. The Royal Proclamation of 1763 stated that "Indigenous people reserved all lands not ceded by or purchased from them" (Hall, 2019). However, treaties have actually served to extinguish aboriginal rights. In fact, "many have argued that at the time the treaties were negotiated, Aboriginal signatories did not understand the treaties as limiting or extinguishing their title" (Hanson, Aboriginal Title, 2009).

In Canada, the term "historical treaties" refers to treaties that were negotiated prior to 1923. These include the numbered treaties, the Robinson and Douglas treaties, the Upper Canada land surrenders, the Peace & Neutrality treaties, and the Peace & Friendship treaties. If you're curious to learn more about those treaties, see this page (Government of Canada, 2020).

Historic Treaties and Treaty First Nations in Canada

Historical treaties required a First Nation to "cede, release, surrender and yield up to the Government of the Dominion of Canada, for Her Majesty the Queen and her successors forever all their rights, titles and privileges whatsoever to the lands included within the following limits…" (Donovan & Company, 2007). Members of these nations would then be forced to reside on reserves, and, in return, could receive annual payments from the government and retain their hunting and fishing rights.

Since the 1973 *Calder* decision, Canada has entered a new era of treaty negotiations. Modern treaties, also known as Comprehensive Land Claims, outline the relationship between the First Nation(s) in question and the provincial and/or federal government. It is optional for First Nations to enter the modern treaty process. Modern treaties may include (Government of Canada, 2020):

- Consultation and participation requirements
- Ownership of lands
- Wildlife harvesting rights
- Financial settlements
- Participation in land use and management in specific areas
- Self-government
- Resource revenue sharing and measures to participate in the Canadian economy
- Preparations for when the agreement takes effect (such as implementation planning)

For more information about the specifics of modern treaties, visit this site (Government of Canada, 2015).

In BC, there were much fewer historical treaties negotiated than the rest of the country. The province has its own body that deals with the modern treaty negotiation process, called the BC Treaty Commission. The commission works with the Federal Government and the First Nations Summit throughout the treaty process.

The Treaty Process

So why would First Nations enter the treaty process? Why would they be reluctant to enter the process?

Benefits include clear land ownership, cleat plans for land use and governance, a sum of money, or other benefits. Risks include requirements of the first nation to give up unresolved title to their land, they may lose hunting, fishing, or other cultural rights, they may lose governance right, and the process is long.

Figure 1.

Interactive Map of Historic Treaties and Treaty First Nations in Canada

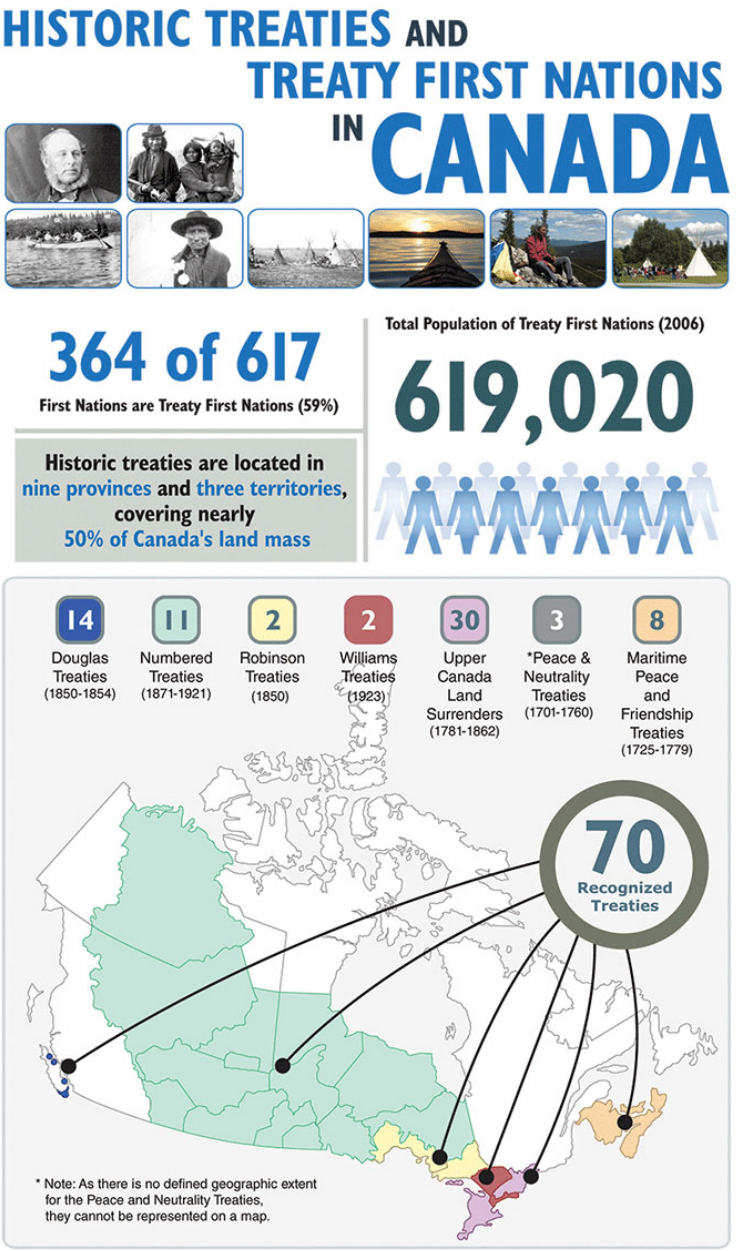

FIG 2 – Historic Treaties and Treaty First Nations in Canada Infographic

Licensed under a non-commercial use license. Note: Image links to source with interactive version of image. You can click on the numbers in the squares above the map image to learn more about the relevant treaties.

*Additional Re*adings & Resources

- Assembly of First Nations. (n.d.). Land and Claims. https://www.afn.ca/policy-sectors/lands-claims/
- BC Treaty Commission (https://www.bctreaty.ca)
    - BC Treaty Commission. (2022). *Why Treaties?* https://www.bctreaty.ca/why-treaties* *from the BC Government perspective
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Media Attributions

- Historic Treaties and Treaty First Nations in Canada Infographic © Crown-Indigenous Relations and Northern Affairs Canada

MODULE 1 - STARTING DIALOGUE AND SYSTEMS THINKING

What does effective and meaningful engagement between engineers and Indigenous communities look like? This module will guide students through First Nation governance and policies, and how to utilize systems thinking in forming partnerships and collaborations with Indigenous communities.

Learning Objectives

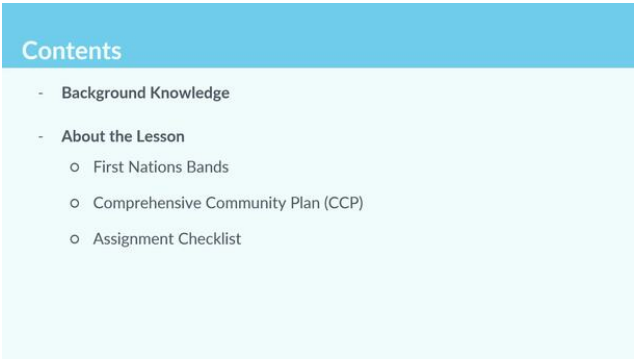
Following this module, students will be able to:

- Describe the characteristics of simple and complex systems
- Express the complexity of intercultural partnerships through the generation of a systems map
- Locate mutually beneficial, sustainable partnership objectives among a list
- Select an appropriate community contact on a First Nation's website
- Re-create a collaboration systems map based on a relevant example
- Acknowledge the importance mapping

communication channels
- Formulate a personal understanding of respectful email communication

Module 1 - Instructor Training

This section provides faculty training to teach Module 1 from the Decolonization curriculum. This training video will walk you through and explain the core concepts that are covered in the lesson plan, as well as some additional information and tips for implementing Module 1 into the classroom. Links to the referenced material in the video can be found in Additional Resources.



A UBC Teaching and Learning Media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1027

Additional Resources

If you are interested in learning more about First Nations governance, and other resources referenced in the above training video, we recommend you explore the links and videos below:

Hereditary Chiefs

Indigenous Corporate Training, Inc. (2016, March 01). *Hereditary Chief definition and 5 FAQs.* https://www.ictinc.ca/blog/hereditary-chief-definition-and-5-faqs

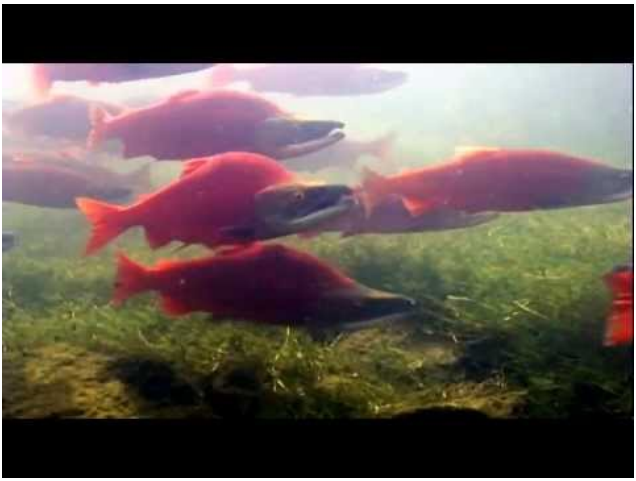
First Nations Websites

Aq'am (https://www.aqam.net)

K'ómoks (https://komoks.ca)

K'ómoks First Nation CCP

K'ómoks First Nation. (2014). *Comprehensive Community Plan Version 1.0, 2014-2024.* Available at https://komoks.ca/wp-content/uploads/2019/10/CCP-Version-1.0-March-2014.pdf



A YouTube element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1027

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K'ómoks First Nation. (2014). *Comprehensive Community Plan Version* 1.0, 2014-2024. Available at https://komoks.ca/wp-content/uploads/2019/10/CCP-Version-1.0-March-2014.pdf

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On this page you will find the corresponding lecture content for Module 1 – Starting Dialogue and Systems Thinking. This sample lesson plan includes the following:

- Student learning outcomes
- Lecture slides
- Lecture notes and activities
- Lesson Summary

You may download any or all of this content and adapt as you wish to implement it in your class.

Student Outcomes

Use these student learning outcomes to guide the implementation of this module into your course.

Lesson Plan – Student Outcomes

At the end of this lesson and accompanying assignment, students will be able to:

- Describe the characteristics of simple and complex systems
- Express the complexity of intercultural partnerships through the generation of a systems map

- Locate mutually beneficial and sustainable partnership objectives among a list
- Select an appropriate community contact on a First Nation's website
- Re-create a collaboration systems map based on a relevant example
- Acknowledge the importance of mapping communication channels
- Formulate a personal understanding of respectful email communication

Lecture Slides

The lecture slides for this module are embedded below. Feel free to download and adapt the content as you see fit into your course(s).

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1444#h5p-7

Lecture Notes & Activities

The following lecture notes and activities parallel the content that are in the lecture slides – you may also use this for your reference when teaching this module's content to your class. You may want to share the lecture notes with students to enrich their learning. A downloadable document with the lecture notes and activities can be found at the bottom of this page.

First Nations' Governance

A First Nations band is the term designated by the Indian Act that describes the smallest unit of a group of first nations peoples. For example, the Secwepemc First Nation in BC is composed of 17 distinct bands (Secwepemc, n.d.), which each have their own band councils. On the other hand, some first nations are the same as their bands, like the K'omoks first nation. The band council acts as a local government for the band, and can have jurisdiction over land use, education, health, and other departments relevant to the functioning of the band. Each council is composed of 1 elected chief and at least 2 elected councilors. The number of councilors is representative of the number of people in the band.

Prior to the implementation of the Indian Act, many Indigenous governance systems were based on hereditary leadership. Hereditary leaders inherited responsibilities to their community and their culture.

Because the chiefs & councilors are elected by the band, the elected chief is not necessarily the hereditary chief.

Many bands and tribal councils have websites with tons of information about:

- History
- Traditional lands
- Governance Structure
- Administrative Directory
- Departments (if the community is large enough) & Projects
- Current Alerts
- Language resources
- Comprehensive Community Plan

Comprehensive Community Plans

One thing you may find on a community's website is a **comprehensive community plan [CCP]**. A comprehensive community plan (CCP) is a detailed plan created by and for a First Nations community with the purpose of creating community guidelines on (Indigenous Services Canada, 2021) :

- Governance
- Land & Resources
- Health
- Infrastructure Development
- Culture
- Social
- Education
- Economy

The CCP (K'omoks First Nation, 2014) may cover how the lands and waters within a community should be used and developed, and how local municipalities, governments, private companies, and individuals can interact with the land in the future. It assists with the planning of future developments and delineates what the land can be used for and by whom. The plan may also include an

implementation strategy that "ensures that the directions set out in the plan are achieved".

CCPs may be useful to engineers who interact with the First Nations community. For example, the CCP may:

- outline which lands can be developed for certain purposes, such as water & sewer lines and treatment facilities or installments of energy generation infrastructure
- outline the preferred communication strategy for contractors or businesses looking to partner with the community
- entail what types of commercial business they would allow to operate on their land
- outline what types of resources they want to invest in (green energy, for example)
- outline other plans for community economic development, such as who may be employed within the territory/reserve/ treaty area

For example, say you are working for an engineering firm that wants to approach the K'omoks First Nation for the purpose of collaboration on a project in the First Nation.

1. **Go to the First Nations Website**
    - Go to K'omoks and Aq'am
2. **Review the Site**
    - Look around and answer: What do you notice on the website?; Does the website include things mentioned on the previous slides?
3. **Review Community Strategic Plan**
    - Navigate to the Community Strategic Plan: K'omoks and

Aq'am

4. **Review Additional Links**

    - Click on the link at the bottom of the page: K'omoks video, or Aq'am

Consider, what parts of the plan are most applicable for engineers? The K'omoks plan has 9 main goals and is centered around four pillars: Past; Present; Future; and Community Action Plan (CAP).

Four sections of the plan are immediately relevant to engineers: 4.3 – Future Land Use; 4.4 – Future Infrastructure; 4.7 – Economic Development; and 4.8 – Sustainability.

Let's explore Section 4.3 a bit deeper to better understand why it could be useful to engineers hoping to engage with the community. When you are doing the assignment later, make sure to look over more than just this section, since land use is only one of many pieces to consider here.

4.3 – Future Land Use

Section 4.3 is broken into two parts: Goals and objectives. Read through the goals first. Most of the goals are relevant to use! Using these, we, as engineers, must be mindful to:

- Work with K'omoks land & history during development
- Respect the "environment,cultural sites, special features, habitat and the landscape"
- Clearly outline what the benefits are for the First Nation from your project
- "Provide opportunities for members to be part of long term, sustainable economic activities"

Next, we can read through the objectives. Not all of these will pertain to us, but we can pick out the ones that do. Take a few minutes and find two objectives that we need to be mindful of. Once you've found them, how do we incorporate those into our communications and/or action

Number 5: Establish that outside agencies and developers must complete all application/partnership requirements defined by KFN before proceeding with any development proposals.

On our side, that means that we need to be making sure that we have completed all the application/partnership requirements before proceeding with a proposal.

Number 16: The use of local materials (such as timber from our own lands) and labour whenever possible is encouraged to reduce economic leakage from K'ómoks First Nation and the surrounding jurisdictions.

Keep this in mind throughout the proposal & development process! You will need to incorporate into your planning how you plan to source materials and labor in order to meet this objective.

Collaboration in Action

So we mentioned sustainable relationships in the past slide, what are the 3 pillars of sustainability? Social, environmental, and economic! When doing any consulting work, we want to work toward solutions that meet all three pillars. So let's say your vision and values align with the community. What's next? Contact! But who should you contact?

Exercise – Finding the Correct Contact

1. Use the Aq'am First Nation community website to determine who is the best person to contact. They have a contact directory that lists who to contact in each department.
    a. Who would you contact first about leasing land for a business?
    b. Who would you contact first about lands and natural resources?
    c. Who would you contact first about community government?
    d. Who would you contact first about language & culture?

If your project falls under the portfolio of an existing department (for example lands and resources, reach out to the Lands and Resources Project Coordinator), otherwise speaking to the reception first, they will be able to guide you to the correct person.

Systems Thinking

Systems thinking is a crucial concept to understand before engaging with Indigenous communities, but even if you aren't working with Indigenous communities, it is important for all engineers to be somewhat familiar with the topic. There are three

types of systems we are likely to encounter as engineers: Simple, Complicated, and Complex.

Simple systems have known knowns (AKA all the variables are known), so they are solvable. For example, the equation of a line with a known x or y value is solvable. The cause and effects in this system are clear.

Complicated systems have known unknowns, like a large system of equations that can be only solved with a matrix. In this case, the cause & effect relationships are separated by space & time. You can utilize systems thinking to solve these systems.

Lastly, there are **complex systems**. Complex systems have unknown unknowns, so you don't know the framework or the variables. The cause & effect relationships aren't repeated, and the system is only coherent in retrospect.

For example, your household growing up was a simple system. There's you, some siblings, and probably one or two guardians. You can easily map that system in terms of who is related to who. A complex system, though, is hard to map. These systems involve many variables, and many of those variables are dependent on one another. You cannot control the outcome of a complex, systematic problem. However, you can learn the nuances of the system & understand outcomes retroactively. In these cases, the whole of the system is greater than the sum of its parts. Some examples of complex systems and problems include weather predictions, racism, or tracking a virus (epidemiology).

So as an engineer, how should you think about systems? How often do you interact with complex systems?

If you work in construction, infrastructure planning, natural resources, or a similar field, you probably collaborate with organizations or communities with different values, goals, motives, and structure. Cross-culture or cross-organizational collaborations

are complex because they involve a reliance on people, and people are complex. When you or your organization enters a collaboration, you are met with unknown unknowns. Until the project is complete, you won't be able to track the effects of a decision, since the outcome of a decision relies on numerous moving parts.

Application

Mapping Communication Channels

We can map our communications in a Systems Map. We need to understand where lines of communication exist so that you can ensure the right people are getting the right information.

Consider a bicycle wheel. If the wheel represents a communications framework, we are all spokes and a communication map is the wheel holding the spokes. Mapping communications helps us keep track of what everyone needs to know and what they are expected to bring to the conversation.

Exercises – Systems Map Scenarios Brainstorm

You work for a construction company that specializes in “green” solutions. You want to approach a local First Nation to collaborate on a greenhouse project. Your company is willing to subsidize a large part of the project. Consider:

- What stakeholders do we need to include in our systems map?
- Can we use the CCP to figure this out?
- Which stakeholders communicate with each other?
- After you’ve finished brainstorming, sketch a draft systems map based on what students have described. Share the following systems map for students to follow along.

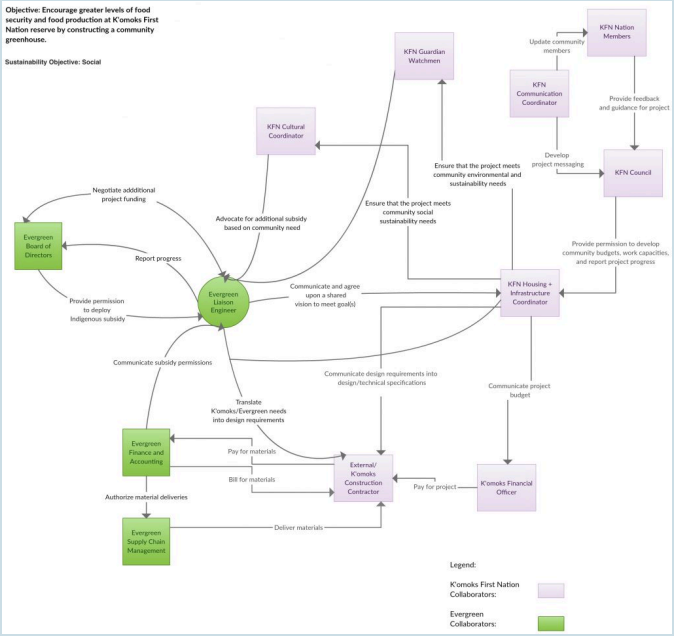

FIG 3 – Example of a Collaborator System Map

Afterward completing the activity, share tips on how to create a systems map:

1. Start by listing your stakeholders! Stakeholders within your company, within the First Nation, and externally.
2. Determine who are the two initial people involved in the communication.
3. List who needs to directly communicate with who on paper, a Word document, a whiteboard, or some other medium that can easily be changed.
4. Plan the layout of the system map. Consider the following:

- It is a good idea to keep multiple stakeholders from the same main group (e.g. various departments in the First Nation) in the same area of the chart
- Assign one color and/or shape to stakeholders within one main group
- Make the initiator (you!) a special shape so you are easily identifiable

Drafting an Engaging Cold Email

A good cold email will include the following: provide context, give details, and include a call to action. Providing context means explaining why you are contacting them, giving them the details necessary to move them from understanding towards action, and a call to action let's the recipient know what you need from them.

Exercise – Drafting a Cold Email

Write a cold email you would send to to the Aq'am First Nation XXXX. Use the textbox or open a Word document.

Downloadable Files

Downloadable Lecture Notes

Module 1: Lecture Content (Word)

Sources

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Media Attributions

- Example of a Collaborator System Map © Pamela Wolf is licensed under a CC BY-NC-SA (Attribution NonCommercial ShareAlike) license

Module 1 - Sample Assignment & Rubric

This page outlines the assignment students are to complete for this module. Included, you will find:

- Student learning objectives
- Assignment details and introduction
- Assignment deliverables
- Assignment rubric

A downloadable file of the assignment can be found at the bottom of this page.

Learning Objectives

Assignment – Student Objectives

After completing the following assignment, students will be able to:

- Describe the characteristics of simple and complex systems
- Express the complexity of intercultural partnerships through the generation of a systems map
- Locate mutually beneficial and sustainable

partnership objectives among a list
- Select an appropriate community contact on a First Nation's website
- Re-create a collaboration systems map based on a relevant example
- Acknowledge the importance of mapping communication channels
- Formulate a personal understanding of respectful email communication

Assignment

Assignment – Setting the Stage

You are working for Evergreen, a sustainable construction material company. Management has recently updated the company mission statement. Good news! Project collaboration with Indigenous communities has now become a key priority. This change is also reflected in the company's budget, where funds have been allocated to cover Indigenous engagement activities, visits to partnered communities and subsidized costs to Indigenous partners for your flagship product, a lightweight insulating glass.

Indigenous and remote communities are a potential market

for your company because your glass has worked well in greenhouses and detached homes. The Indigenous population is the fastest-growing demographic in Canada, so housing and agricultural loads are expected to rise in remote communities across the nation. Office buzz around indigenizing the company has faltered, and little has been done so far to partner with communities, so you have decided to act. You visit the website of a nearby Indigenous community, K'omoks First Nation and discover their Comprehensive Community Plan, which clearly delineates the nation's governance, history, work capacity and goals. You decide to create an engagement strategy to collaborate with K'omoks.

Take some time before you do the assignment to read through the 9 main goals, found on page 17 of the CCP.

Assignment Details

1. Identify one social, one environmental and one economic collaboration objective (three total) that would mutually benefit K'omoks Nation and Evergreen. These are to be written as titles on separate pages with the associated sustainability dimension clearly indicated. Take for example the following social collaboration objective: Encourage greater levels of self-sufficiency and security in food production on the K'omoks First Nation reserve by constructing a community greenhouse. (Social)
2. Map the Evergreen, K'omoks and external collaborators, their proposed role and the flow of information that would be required to support the complete realization of each shared

objective. There will be three maps in total, one for each sustainability pillar objective. The system map is to occupy the space below each objective title and the map components will be legible and easily distinguishable from one another. A reader should understand the proposed role of a collaborator at a glance. Example systems map

3. Identify an appropriate first point of contact at K'omoks Nation and includes a draft email proposing an introductory conversation. Emails can be found on the K'omoks First Nation Website. A stellar email will respectfully and concisely call the proposed point of contact to action. This email, its proposed contact and the subject line are to be included in the pdf document after the objective maps. Important note: This draft email will NOT be sent to the contact. The draft will be submitted as text within the deliverable pdf. The purpose of this email draft is to think critically about how to respectfully begin a dialogue and express interest in working together toward a common goal with a community.
4. Outline and justify in 2-3 sentences the step in the design process where Evergreen should contact K'omoks to begin a collaboration. Recall, the four steps of the design process are: study and clarify the problem, generate potential solutions, identify the most promising solution, and develop & test the solution. Please answer question 4 using the steps in this design framework.

Assignment Deliverables

You will submit one PDF document which:

1. Identifies one social, one environmental and one economic collaboration objective (three total) that would mutually benefit K'omoks Nation and Evergreen.

2. Maps the Evergreen, K'omoks and external collaborators, their proposed role and the flow of information that would be required to support the complete realization of each shared objective.
3. Identifies an appropriate first point of contact at K'omoks Nation and includes a draft email proposing an introductory conversation.
4. Outlines and justifies in 2-3 sentences the step in the design process where Evergreen should contact K'omoks to begin a collaboration.

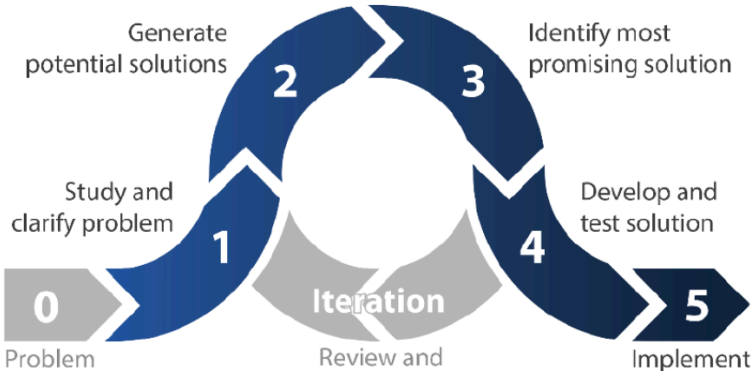

FIG 4 – *Design Process*

Guiding Questions for Success

- Can you clearly articulate the value proposition to management at Evergreen and different stakeholders K'omoks Nation?
- Are you considering the full diversity of stakeholders internal

and external to K'omoks and Evergreen?

Rubric

A sample rubric to evaluate your students' assignments is found below. Feel free to download and adapt the rubric to match your assessment procedures (i.e. changing weights, etc.).

Benchmark Grade	Identifying mutually beneficial objectives for the company and community (20%)	Mapping the objective stakeholders and flow of information (30%)	Encouraging collaboration through an introductory email (30%)	Document Format (20%)
100%	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.
90%	Objectives are thoughtful and encourage a strong/ urgent desire for action. The common objectives are written in a manner that demonstrate good-faith and concern for sustainability.	Maps provide equitable roles and responsibilities that if implemented, could build the capacity of the company and partner community while also reaching the primary objective. These maps would serve as an excellent, respectful visual aid for initial conversations with the partner community, and reflect a desire for reconciliation.	The email and point of contact are entirely appropriate, respectful and demonstrate an an awareness of the community's goals and capacities. The message communicates that an introductory conversation between the community and Evergreen would be in the spirit of collaboration and good faith, while appealing to shared benefit.	All format expectations were followed as described in the assignment outline

Benchmark Grade	Identifying mutually beneficial objectives for the company and community (20%)	Mapping the objective stakeholders and flow of information (30%)	Encouraging collaboration through an introductory email (30%)	Document Format (20%)
70%	Objectives provide concrete commonality between the company and partner community, however they do not provide adequate coverage of the three pillars of sustainability. The objective may also be lacking equitable benefit distribution between the company and community.	Maps clarify the roles, responsibilities and flows of information to many potential collaborators and stakeholders. The maps outlines a stable system to reach the objective, but miss some components of shared project ownership.	The selected contact and email are likely to encourage a follow up from the recipient, but certain portions of the email could be omitted or modified to strike a respectful and professional tone.	Most format expectations were followed as described in the assignment outline, with a couple of minor errors.
50%	Objectives are either unfeasible or inadequately address the needs of your company or partner community	Maps outline some objective members and flows of information, but are not useful due to lack of scope or detail	Either the selected contact or content the of the email does not align with the goal of encouraging new partnership and collaboration. This may be due to a lack of respectful communication, message focus or an unclear call to action.	Format expectations as described in the assignment outline were somewhat followed.

Benchmark Grade	Identifying mutually beneficial objectives for the company and community (20%)	Mapping the objective stakeholders and flow of information (30%)	Encouraging collaboration through an introductory email (30%)	Document Format (20%)
0%	Objectives are neither feasible nor mutually beneficial to the company or community	Maps do not clarify the interdependency of collaborators on the success of the project, either through lack of clear structure or misinformation	The selected contact is not appropriate for the purpose of the email is counter-productive to the goal of encouraging collaboration and trust-building.	Format expectations as described in the assignment outline were ignored or unread.

Downloadable Files

Downloadable Files

Module 1 Assignment (Download)

Additional Sources

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https://www.aqam.net/sites/default/files/AQAM_ka%20kniłwitiyała%20%20our%20thinking%202017.pdf

Note: This is the Community Strategic Plan of ʔaq̓am Nation. You can compare the objectives of K'omoks Nation to those outlined by ʔaq̓am Nation to get a sense of common goals and variation in community values across First Nations.

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MODULE 2 - ADDRESSING AND SYNTHESIZING DIFFERENT "WAYS OF KNOWING"

How do we synthesize empirical and Indigenous ways of knowing in our engineering work? This module will guide students through how to understand different ways of knowing, and how to use tools like polarity maps to integrate different cultural and knowledge systems.

Learning Objectives

After completing this module, students will be able to:

- Define “way of knowing”
- Appraise the strengths and limitations of the empirical way of knowing
- Differentiate normative claims from prescriptive claims
- Synthesize two cross-cultural perspectives to create a shared strategy with polarity mapping
- Construct a polarity map based on a general recipe

Module 2 - Instructor Training

There are no additional trainings required for Module 2. However, we encourage you to review the trainings on “Ways of Knowing” before implementing this module into your classroom.

Module 2 - Sample Lesson Plan

On this page you will find the corresponding lecture content for Module 2 – Addressing and Synthesizing Different "Ways of Knowing." This page sample lesson plan includes the following:

- Student learning outcomes
- Lecture slides
- Lecture notes and activities
- Lesson Summary

You may download any or all of this content and adapt as you wish to implement it in your class.

Student Outcomes

What is a way of knowing? Students, teachers and engineers are being asked to consider Indigenous "ways of knowing", which may sound foreign from the way in which engineers apply knowledge. What is being asked of engineers when considering Indigenous ways of knowing? What should be done about conflicting worldviews in engineering projects? These questions will be answered in this module.

Lesson Plan – Student Outcomes

At the end of this lesson and accompanying assignment, students will be able to:

Knowledge

- Define “way of knowing”
- Appraise the strengths and limitations of the empirical way of knowing
- Synthesize two cross-cultural perspectives to create a shared strategy with polarity mapping
- Differentiate normative claims from prescriptive claims

Skills

- Construct a polarity map based on a general recipe
- Demonstrate cross-cultural analysis by compiling the guiding principles of two ways of knowing

Attitudes

- Express interest in uncovering personal and group biases
- Reconcile and reframe apparent unresolvable, opposing problems by using a polarity map

Lecture Slides

The lecture slides for this module are embedded below. Feel free to download and adapt the content as you see fit into your course(s).

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1046#h5p-8

Lecture Notes & Activities

The following lecture notes and activities parallel the content that are in the lecture slides – you may also use this for your reference when teaching this module's content to your class. You may want to share the lecture notes with students to enrich their learning. A downloadable document with the lecture notes and activities can be found at the bottom of this page.

Ways of Knowing Defined

To begin, let's define what is meant by a "way of knowing". A way of knowing is a tool used to acquire knowledge. These tools include:

- Language.
- Sense Perception.
- Emotion.
- Reason.
- Imagination.
- Intuition.
- Memory.
- Faith.

There is no "perfect" method to acquire knowledge. Some people prioritize a way of knowing that is useful to society, to themselves, or to some other goal.

The Difference Between What we Know & Ways of Knowing

To clarify the difference between what we know and ways of knowing: what we know is what we have taken to be true. For example, "the grass is green", or "I love my cat" are things that I know. How I came about that knowledge is a way of knowing. So I know the grass is green based on observation. I know that I love my cat based on the emotions I feel when I interact with him.

The Empirical Way of Knowing

One such way of knowing is near and dear to scientists and engineers worldwide is empiricism. The empirical method supposes that the way that we gain knowledge is primarily by sensory experience. Although this may seem to be self-evident to those who have been scientifically trained, this is a relatively new feature of human thinking that was only explicitly formulated three centuries ago by John Locke. The empirical method is especially useful for creating and distributing knowledge systems (e.g. sciences) that delineate the specific properties of the natural world.

In 2015, the Laser Interferometer Gravitational-Wave Observatory (LIGO) detected a cataclysmic cosmic event; two black holes with 30 times the mass of the sun had collided in the distant universe. This collision caused detectable ripples in spacetime, which were independently observed at the LIGO observatories in Livingston,

Louisiana and Hanford, Washington in the United states. This observation aligned with a theory postulated 100 years ago by Einstein that gravitational waves exist. The empirical evidence is strong: the "fingerprints" that are left behind by the collision were measured in Livingston and Hanford, and they are nearly identical when superimposed. Astrophysicists can now confidently declare that gravitational waves exist, thanks to empiricism and the scientific way of knowing, or method. Framing the truth to be what is observable is a powerful tool for understanding the physical world.

Limitations of the Empirical Way of Knowing

However, what is science unable to do? Science does not provide a framework for making statements of value. For example, Scottish historian and philosopher David Hume noted the difference between descriptive and prescriptive statements. **Descriptive** statements can be directly observed, whereas prescriptive statements describe what will happen. Assumptions must be made when you justify a prescriptive statement with a descriptive statement.

Take for example the declaration: "Our human ancestors ate the meat of domesticated and wild animals, so vegetarians should really be eating meat". Here, we have two statements. One descriptive statement about the nature of the human diets, historically speaking, and one prescriptive statement related to what vegetarians should be doing instead of avoiding meat. The prescriptive statement presumes that what is "natural" is more important than the vegetarian's choice to abstain from meat. This prescriptive statement on value pertains to ethics and cannot be inferred by scientific observation. A leap must be made to connect the descriptive and prescriptive statements. Here are some other

questions whose answers cannot be derived from the scientific way of knowing alone:

Moral judgements	**Aesthetic judgements**	**Uses of scientific knowledge**
Should we send people to prison?	Is country music better than hip hop?	Should we use genome editing to cure disease?
Should education be mandatory?	Is it preferable to live in the beauty of the country or the liveliness of the city?	Is Artificial Intelligence safe enough to be commonly used in self-driving cars?

Questions like these that partially or fully outside of the realm of science have far-reaching implications in the ways we structure societies. Engineers are entrusted to make decisions on behalf of populations with highly variable values and belief systems. If engineers are to suit the project to the user or group of users, we must understand what other ways the users have come to understand existence. Our designs better serve people when we accept different ways of knowing as being valid.

Ways of Knowing, Equity, and Synthesis

Engineering culture values *reason*, *progress* and *rationality*. The fast-paced technological environment that we work in requires a keen understanding of the empirical. Ideas and ways of knowing that don't align with traditional methods of acquiring knowledge in engineering are often "ignored". To treat different ways of knowing equitably, we need to consider different sources of the truth and of value as both real and consequential.

FIG 2.0 – *A straight, horizontal line is added to a circle, to create a horizontal spiral. This image depicts the synthesis of two ways of viewing time – linearly and cyclical.*

Consider the way we view time. Some people visualize time as a linear concept. Others view time as a cycle. One way to synthesize these concepts visually would be to depict time as a cyclical roller coaster:

Let's look at another example. Consider a rock: is a rock alive?

According to Empirical knowledge, a living thing:

- Eats
- Breaths
- Reproduces
- Grows
- Poops
- Responds to the environment (sweats in the heat, shivers in the cold, etc.)

Based on observation, a rock doesn't do any of these things, so according to the empirical way of knowing, a rock is not alive! Let's say there is a body of knowledge, though, that says everything on Earth is alive, including rocks, water, and wind. According to this body of knowledge, the rock is alive.

So, is the rock *really* alive? Well, in the empirical definition, no! But the other way of knowing cannot be disregarded or disrespected. So according to that way of knowing, the rock *is* alive! To consider different ways of knowing equitably, you must acknowledge that

spiritual or emotional justification, not just the empirical, is valid & valuable.

To design equitably, we must synthesize the ways of knowing of all collaborators participating in a design project. Let's consider an example of this. Say you work for a sportswear manufacturing company, which specialized in items such as hockey and lacrosse sticks. Your manager has recently asked you to liaise with a prominent Canucks player to try and sell a custom hockey stick to him.

You have a background in materials engineering. Therefore, you are well versed in what range of elastic modulus, toughness, and strength is required of the materials you use when manufacturing the hockey sticks. You understand that the density of the material is important, and you tend to stick to density standards set out by your company. You know that you can absolutely sell a good stick to your client as long as the client can describe the technical specifications of his favorite stick(s). You set up a meeting with your client and are shocked when he describes what he needs.

Client: It can't be too heavy since I focus on quick stick work. it needs to have some "give" but stiff for pokes. I need an extension of my body, not deadweight. It's got to be balanced, it can't have a bunch of extra weight in weird spots, otherwise I can't get a fast shot off. The blade needs to be curved but not too much. It also needs to have some flex for the slap shots.

Is your way of knowing what goes into the perfect hockey stick flawed? Is your client's? No! You both use observation and testing to determine the best hockey stick – you just need a way to translate between the ways of knowing to benefit both you and your client.

Respectfully Synthesizing Ways of Knowing

What happens if two ways of knowing conflict with each other, or if it appears that there is no way to synthesize the two ways of knowing? In the engineering design process, who gets to decide the necessary assumptions on what is valuable and what is not? The answer is that those who will be affected will decide.

Problems vs Polarities

Equipped with the empirical scientific methods, engineers are famously skilled problem solvers. One popular problem solving strategy is to simplify complex systems into smaller, more manageable problems. Although useful, it is not always the best strategy. As previously established, there is no objective right answer to questions pertaining to values, unless assumptions are made. In these more complex cases, multiple equally plausible points of view need to be synthesized into a strategy. Discussions can become especially contentious when the participants in strategy development bring forward diverse ways of knowing. A great tool to reach for during these seemingly clashing is the polarity map

When to Use a Polarity Map

The development of a polarity map allows a group of people to become more aware of the advantages and drawbacks to a pair of strategies that may seem at odds. This process can be applied to synthesize ways of knowing, since all ways of knowing have different domains of utility. Some great indicators that a polarity based mindset is useful to apply are:

- There is no way to know that one proposed point of view or strategy is better than the other.
- The dilemmas produced by differing priorities and strategies are ongoing, and seemingly unresolvable.
- Success hinges upon collaboration and mutual understanding of all parties involved.

How to Create a Polarity Map

Once you have identified that a polarity map is useful, build a map together with this recipe.

1. **Define the Challenge:** Identify a task that both parties have the ability to change which has not yet been achieved. This challenge is the worthwhile goal of synthesizing seemingly opposing strategies.
2. **Identify Key Polarities:** Select the x axis of the plot, with each end of the axis representing alternative strategies or priorities. These are to be written as complete sentences..
3. **Label Poles:** Include unbiased labels for both poles
4. **Brainstorm Content:** Identifying the positive and negative aspects of each pole. One method is to have team members write this content on sticky notes and subsequently place them on the map together while justifying their inclusion in the matrix.
5. **Identify the Action Steps:** These action steps are what can be done as a whole to reap the benefits of each pole.
6. **Identify Early Warnings**: These warnings will act as caution flags when the strategy to achieve the challenge is incurring the drawbacks of each pole.

Examples could include:

- Any project: Client needs vs contractor needs
- Site C dam: BC hydro vs local Indigenous peoples
- Choosing stability or change

Use the Empty Polarity Map and Completed Polarity Map by Barry Johnson and Polarity Partnerships, LLC as an example.

Lesson Summary

This information is key to understanding how Western Scientific authority is used to "other" Indigenous and other perspectives, and provides a method to synthesize ways of knowing instead of resorting to exclusionary practices.

Lesson Plan – Student Takeaways

A summary of the lesson can be found below:

- Introduced ways of knowing as a framework for interpreting reality
- Defined the empirical method and outlined its utilities and limitations
- Differentiated normative from prescriptive statements
- Introduced equity in ways of knowing as a tool for decolonization of engineering
- Outlined the process for creating a polarity map

Downloadable Files

Downloadable Templates – Module 2 Lecture Notes

Module 2 Lecture Content (Word)

Sources

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Module 2 - Sample Assignment & Rubric

This page outlines the assignment students are to complete for this module. Included, you will find:

- Pre-assignment reading
- Student learning objectives
- Assignment details and introduction
- Assignment deliverables
- Assignment rubric

A downloadable file of the assignment can be found at the bottom of this page.

Pre-Assignment Reading

Please have your students read the following CBC article, court case summary and the timeline of events below, before starting the assignment:

1. CBC Article: 'We still have title': How a landmark B.C. court case set the stage for Wet'suwet'en protests
2. Court Case Summary: Delgamuukw Case

Learning Objectives

Assignment – Student Objectives

After completing this assignment, students will be able to:

Knowledge

- Define “way of knowing”
- Appraise the strengths and limitations of the empirical way of knowing
- Synthesize two cross-cultural perspectives to create a shared strategy with polarity mapping
- Differentiate normative claims from prescriptive claims

Skills

- Construct a polarity map based on a general recipe
- Demonstrate cross-cultural analysis by compiling the guiding principles of two ways of knowing

Attitudes

- Express interest in uncovering personal and group biases
- Reconcile and reframe apparent unresolvable, opposing problems by using a polarity map

Assignment

Assignment – Setting the Stage

Please review this condensed timeline of the given case study:

- **2012** — TC Energy is selected by LNG Canada to design, build, own and operate Coastal GasLink. TC Energy begins a community engagement process, followed by environmental and engineering studies along the proposed route.
- **2014** — Coastal GasLink files the Environmental Assessment Application with the BC Environmental Assessment Office and a detailed project design application to the BC Oil and Gas Commission. The project's conditional Environmental Assessment Certificate was awarded on October 24, 2014.

  In November 2014, the Wet'suwet'en First Nation Band, Chief and Council and the Province of British Columbia, represented by the Minister of Aboriginal Relations and Reconciliation signed the "Natural Gas Pipeline Benefits Agreement", outlining a project payment of 2.32 million dollars in exchange for use of land encompassed in Wet'suwet'en territory along with other benefits.
- **2019** — The Wet'suwet'en Nation comprises 5 clans, each clan split into house groups who take care of

different territories. The Unist'ot'en House of the Gilseyhu Clan are responsible for protecting a territory known as Talbits Kwa, through which the Coastal Gaslink pipeline is proposed to be constructed. The main access to this territory is the Morice River Bridge. Many of the Wet'suwet'en hereditary chiefs oppose the pipeline plans, and the Unist'ot'en house have committed themselves to safeguarding with the construction of checkpoints along the road to Unist'ot'en. These checkpoints were used to prevent Coastal Gaslink from beginning pipeline construction in the territory.

On January 7th, 2019, the Supreme Court of British Columbia issued an injunction, (a judicial order compelling a party to do or refrain from certain acts) prohibiting the prevention of freedom of movement over the Morice River Bridge. This injunction application was made on behalf of the plaintiff, Coastal Gaslink Pipeline LTD to those delaying access to the bridge and preventing the construction of the Coastal Gaslink Pipeline. This order also included enforcement injunctions so that the Royal Canadian Mounted Police (RCMP) and other appropriate police authorities could forcibly arrest and remove any person contravening the order, and detain them until they appear before the court.

In the following weeks, the Unist'ot'en camp which occupied the Morice River Bridge was dispersed. The RCMP detained and arrested 14 protesters on-site, enabling Coastal Gaslink passage across the bridge. This sparked Indigenous rights and environmental

solidarity protests in 70 cities around the world, according to the Unist'ot'en.

- **2020** — May 14, 2020, a Memorandum of Understanding between the Ministers of Indigenous Relations and the 9 active Wet'suwet'en Hereditary Chiefs that recognize Indigenous rights and title through hereditary governance and commit to negotiations over the following 12 months.

Assignment Details

1. Answer the following: What are the differences in the ways of knowing sovereignty between Coastal Gaslink Pipeline LTD and the Wet'suwet'en hereditary chiefs?
    - Hint: This question relates to the interpretation of legal authority. Please answer this by providing two prescriptive statements, one from the perspective of each party.
    - Example of a prescriptive statement: Engineering students should keep up with current events.
        - What are the assumptions that justify these two prescriptive statements?
    - Example assumption: Current events allow engineering students to see how their classes apply to the world.
        - Can the proof of the two statements be observed? If so, where? If not, why not?

2. Create a polarity map that clarifies a shared challenge that has not yet been achieved by Coastal Gaslink Pipeline LTD and the Wet'suwet'en Hereditary Chiefs. Imagine that this map could be co-created at the negotiation table by both parties. The instructions for creating a polarity map are below:

    - Define the Challenge
    - Identify Key Polarities
    - Label Poles
    - Brainstorm Content
    - Identify the Action Steps
    - Identify Early Warnings
        - You are encouraged to create your systems map layout to suit your space needs, however the Polarity Map [Web Link] by Barry Johnson and Polarity Partnerships may also be used.

3. Outline and justify in 2-3 sentences the step in the design process where Coastal Gaslink and the Wet'suwet'en should reintroduce consultation measures moving forward.

    - Recall the engineering design process. This is the "recipe" for engineering work and guides the design of shared collaboration objectives. Please answer question 3 using the steps in this design framework.

Assignment Deliverables

You will submit one PDF document which:

1. Answers the question – What are the differences in the ways of knowing sovereignty between Coastal Gaslink Pipeline LTD and the Wet'suwet'en hereditary chiefs?

2. Contains a polarity map that clarifies a shared challenge that has not yet been achieved by Coastal Gaslink Pipeline LTD and the Wet'suwet'en Hereditary Chiefs.
3. Outlines and justifies in 2-3 sentences the step in the design process where Coastal Gaslink and the Wet'suwet'en should reintroduce consultation measures moving forward.

Supplementary Articles and Other Resources

- **CBC News:** Why Coastal GasLink says it rejected a pipeline route endorsed by Wet'suwet'en hereditary chiefs
- **CBC News (Opinion):** There are two kinds of Indigenous governance structures, but Canada has been listening to just one
- **The Globe and Mail (Opinion):** The Coastal GasLink dispute highlights the complicated, essential need to balance rights
- Natural Gas Benefit Agreement between Wet'suwet'en and British Columbia
- Supreme Court Injunction
- Analysis of the Application of Injunction

Rubric

A sample rubric to evaluate your students' assignments is found below. Feel free to download and adapt the rubric to match your assessment procedures (i.e. changing weights, etc.).

Benchmark Grade	Identifying ways of knowing (20%)	Evaluating and Identifying assumptions that uphold the ways of knowing (20%)	Respectfully synthesizing ways of knowing with a polarity map (40%)	Document Format (20%)
100%	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and aapproaches researched and implemented above and beyond standard expectations.
90%	Given any knowledge claim, student has the ability to isolate and understand which ways of knowing were used to acquire this knowledge. . All written work is unbiased and shows that student understands the validity of all ways of knowing.	Excellent understanding of the different ways of knowing and interpretation of legal authority. Prescriptive statements are written in a manner that show good understanding of normative claims and prescriptive claims.	Polarity map clearly states the shared challenge and demonstrates an excellent understanding of both perspectives. Respective ways of knowing are used to clarify and explain both persrpectives. There is careful attnetion to detail presented in both perspectives allowing for a unique synthesis of opposing ideas.	All format expectations were followed as described in the assignment outline

Benchmark Grade	Identifying ways of knowing (20%)	Evaluating and Identifying assumptions that uphold the ways of knowing (20%)	Respectfully synthesizing ways of knowing with a polarity map (40%)	Document Format (20%)
70%	Given any knowledge claim, student has the ability to isolate and undersand most of the ways of knowing used to acquire knowledge claim. All written work is unbiased and shows that student understands the validity of all ways of knowing	Good understanding of the different ways of knowing and interpretation of legal authority. Prescriptive statements are simple and well written.	Polarity map clearly states the shared challenge and demonstrates an excellent understanding of both perspectives. Respective ways of knowing are used to clarify and explain both persrpectives. Polarity map is detailed and presents an adequate synthesis of opposing ideas.	Most format expectations were followed as described in the assignment outline, with a couple of minor errors.

Benchmark Grade	Identifying ways of knowing (20%)	Evaluating and Identifying assumptions that uphold the ways of knowing (20%)	Respectfully synthesizing ways of knowing with a polarity map (40%)	Document Format (20%)
50%	Given any knowledge claim, student has the ability to understand some of the ways of knowing used to make the specific knowledge claim. There is some understanding of the equal validity of all ways of knowing but written work may show some bias towards certain ways of knowing	Minimal understanding of the of the differences in the ways of knowing and interpretation of authority. Prescriptive statements lack clarity.	Polarity map clearly states the shared challenge and demonstrates a good understanding of both perspectives. Respective ways of knowing are used to explain knowledge from both perspectives. There are some missing details in the polarity map leading to a biased synthesis of opposing ideas.	Format expectations as described in the assignment outline were somewhat followed.
0%	Given a knowledge claim student is unable to indenitfy which ways of knowing were used to make the knowledge claim. There is little to no understanding equality and validity of different ways of knowing	Little to no understanding of different ways of knowing and interpretation of legal authority. Work is incomplete	shared challenge isn't clearly stated in the polarity map. There is little to no understanding of how the ways of knowing can be synthesized to bring opposing ideas into one solution.	Format expectations as described in the assignment outline were ignored or unread.

Downloadable Files

Downloadable Assignment

Module 2: Assignment (Word)

MODULE 3 - GUIDING ENGINEERING WORK WITH SOCIAL CONTEXT

How can engineers engage in meaningful and respectful relationships with Indigenous communities? This module will guide students through understanding engineering practice through various lenses, incorporating community knowledge to strengthen engineering work, and respecting Indigenous governance and title.

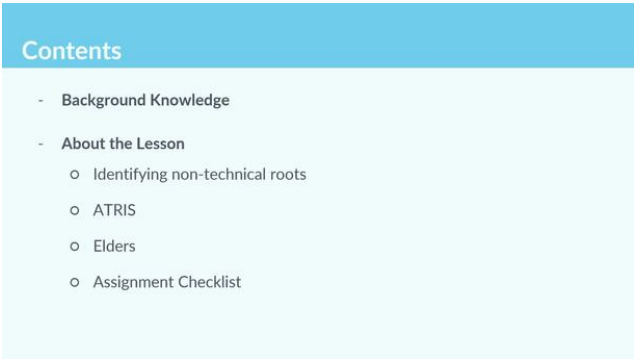
Learning Objectives

After completing this module, students will be able to:

- Critique personal, local and professional enforcement of colonial priorities across cultural boundaries
- Recognize Indigenous legal and social authority in the consultation process
- Identify the Aboriginal and Treaty Rights Information System (ATRIS) system to access local consultation considerations.
- Relate engineering practice to it's local context through the practice of recognizing & synthesizing various ways of knowing
- Understand when and how it is appropriate to engage with Elders in the consultation process

Module 3 - Instructor Training

This section provides faculty training to teach Module 3 from the Decolonization curriculum. This training video will walk you through and explain the core concepts that are covered in the lesson plan, as well as some additional information and tips for implementing Module 3 into the classroom. Further resources that you may find useful as you prepare to implement this module into your classroom can be found in Additional Resources.



A UBC Teaching and Learning Media element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1089

Additional Resources

Local vs Global Design: Currie, S. (2018, July 2). *Global and local design. What's the difference?* i3digital. Retrieved from https://i3digital.com/insights/global-and-local-design-what's-the-difference

Friesen, M.R. & Herrmann, R. (2018, December 12). Indigenous Knowledge, Perspectives, and Design Principles in the Engineering Curriculum. *Proceedings of the Canadian Engineering Education Association (CEEA) Conference*, June 3-6, 2018. DOI: https://doi.org/10.24908/pceea.v0i0.12964

Code of Ethics: Engineers & Geoscientists British Columbia. (n.d.). *Code of Ethics*. Retrieved from https://www.egbc.ca/About/Initiatives-and-Consultations/Code-of-Ethics

Treaty Information and Crown Consultation Process: Indigenous and Northern Affairs Canada (https://www.canada.ca/en/indigenous-northern-affairs.html).

First Nations Profiles: Government of Canada. (n.d.). *First Nation Profiles Interactive Map.* https://geo.aadnc-aandc.gc.ca/cippn-fnpim/index-eng.html

Indigenous Self-Government: Government of Canada. (2020, August 05). *Self-government.* https://www.rcaanc-cirnac.gc.ca/eng/1100100032275/1529354547314

Interactive Indigenous territory maps: Native Land (https://native-land.ca)

Indigenous Languages Dictionary: First Voices. (n.d.). *Get Started.* https://www.firstvoices.com/content/get-started

Engagement Process: Canadian Construction Association. *Indigenous Engagement Guide.* Indigenous Works. Available at

https://www.cca-acc.com/wp-content/uploads/2016/03/IndigenousEngagementGuide.pdf

Indigenous Businesses in Canada: Government of Canada. (n.d.). *Indigenous Business Directory*. https://www.sac-isc.gc.ca/REA-IBD/eng/

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Assembly of First Nations (AFN). (n.d.). *About AFN*. Retrieved from https://www.afn.ca/description-of-the-afn/

Council on Aboriginal Initiatives. (2012). *Elder Protocol Guidelines*. Edmonton: University of Alberta. Retrieved from https://cloudfront.ualberta.ca/-/media/ualberta/office-of-the-provost-and-vice-president/indigenous-files/elderprotocol.pdf

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First Nations Health Authority (FNHA). (n.d.). *Traditional Healing*. Retrieved from https://www.fnha.ca/WhatWeDoSite/TraditionalHealingSite

Government of Canada. (n.d.). *ATRIS – Search*. Retrieved from https://sidait-atris.aadnc-aandc.gc.ca/atris_online/Content/Search.aspx

Organization for Economic Co-operation and Development (OECD). (n.d.). *Better Life Index*. Available at http://www.oecdbetterlifeindex.org/responses/#CAN

We would like to thank Curtis Rattray for his help in developing the information on working respectfully with Elders.

Module 3 - Sample Lesson Plan

On this page you will find the corresponding lecture content for Module 3 – Guiding Engineering Work with Social Context. The sample lesson plan includes the following:

- Student learning outcomes
- Lecture slides
- Lecture notes and activities
- Lesson Summary

You may download any or all of this content and adapt as you wish to implement it in your class.

Student Outcomes

Lesson Plan – Student Outcomes

At the end of this lesson and accompanying assignment, students will be able to:

Knowledge

- Critique personal, local and professional enforcement of colonial priorities across cultural boundaries

- Recognize Indigenous legal and social authority in the consultation process
- Produce a strategy to champion Indigenous values and knowledge in an engineering project (purpose, preparations, research and knowledge gaps)

Skills

- Use The Aboriginal and Treaty Rights Information System (ATRIS) system to access local consultation considerations.
- Articulate the connection between personal, communal and professional values
- Identify intercultural knowledge gaps

Attitudes

- Relate engineering practice to it's local context through the practice of recognizing & synthesizing various ways of knowing
- Act transparently when outlining the purpose and knowledge gaps when creating a knowledge strategy document

Lecture Slides

The lecture slides for this module are embedded below. Feel free to download and adapt the content as you see fit into your course(s).

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://pressbooks.bccampus.ca/decolonizingengineering/?p=1095#h5p-9

Lecture Notes and Activities

The following lecture notes and activities parallel the content that are in the lecture slides – you may also use this for your reference when teaching this module's content to your class. You may want to share the lecture notes with students to enrich their learning. A downloadable document with the lecture notes and activities can be found at the bottom of this page.

Guiding Engineering Work with Social Context

Important Statistic: Only 0.5% of enrolled undergraduate engineering students attending Canadian universities identify as Indigenous (Domsy & Rodrigues, 2020).

This is nearly a tenfold underrepresentation in contrast to the self-identified Indigenous population in Canada. With such a marginal representation of incoming engineers with a primarily Indigenous perspective, it is no wonder that colonial engineering projects have displaced Indigenous context, even within their own unceded territories. Take for example the construction of the Site C hydroelectric project in B.C. Treaty 8 territory. The UN Committee on the Elimination of Racial Discrimination stated in 2019:

"The Committee is concerned about the alleged lack of measures taken to ensure the right to consultation and free, prior and informed consent with regard to the Site C dam, considering its impact on Indigenous peoples' control and use of their lands and natural resources," (The Council of Canadians, 2019)

It is reflexive to take our personal "way of knowing", our fundamental notions of truth for granted when we are surrounded by those who share our same perspectives. Ways of knowing are often in flux and are influenced by our locality. This means that our ways of knowing are shaped by those around us. The underrepresentation of Indigenous peoples in engineering poses a significant challenge for non-Indigenous engineers: How can we ensure that local Indigenous rights, values and priorities are being met through our work, in both treaty and unceded territories?

This can be done by:

1. Making explicit the non-technical underpinnings of personal beliefs, company standards, and engineering practice
2. Considering the locality of belief, values and ways of knowing
3. Respecting Indigenous governance and knowledge before commencing engagement

Step One: Making Explicit the Non-Technical Underpinnings of Personal Beliefs and Engineering Practice

Although engineers require a strong technical, and scientific understanding of their field of work, the practice, engineers are asked to make ethical and value judgments on behalf of those affected by their projects with limited access to stakeholder perspectives and information. This standard is exemplified in the

first guideline in the *Engineers and Geoscientists of British Columbia's (EGBC) Code of Ethics*, to:

hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace.

The primary, overriding responsibility of an engineer in British Columbia is to hold paramount a list of three notions of value, which may carry different meanings depending on social context. To take for example the notion of health, the Canadian First Nations Health Authority, visual depicts the First Nations' perspective on Health and Wellness as follows:

The EGBC code of ethics requires that engineers use their professional opinion to decide whether a project holds paramount health. Engineering decision-making is so complex that the most important ethical guidelines are left to personal interpretation. How does an engineer objectively take into account the complex health, safety and welfare needs of stakeholders with a variety of backgrounds? Engineers do not have a universal answer to this question and must rely on non-technical skills to resolve the complexity. There is a risk that engineers must minimize, this is the knowledge gap between the engineer and those affected by the scope of their projects.

Step Two: Considering the Locality of Belief, Values and Ways of Knowing

Recall that Indigenous is a term in Canada that refers to First Nation, Metis, and Inuit Communities. There are at least 634 culturally distinct First Nations, according to the Assembly of First Nations (Assembly of First Nations (AFN), n.d.), it is important to specify that Indigenous community priorities, values and beliefs are highly

variable. There is no particular, one size fits all set of values to follow, and so work alongside Indigenous communities must be rooted in locality. It should come as no surprise that values are different depending on locality, this is the case across national boundaries as well.

Please scan the global map found at this link, outlining the number one priority of over 100 000 respondents in an ongoing survey conducted by the Organization for Economic Co-operation and Development (OECD).

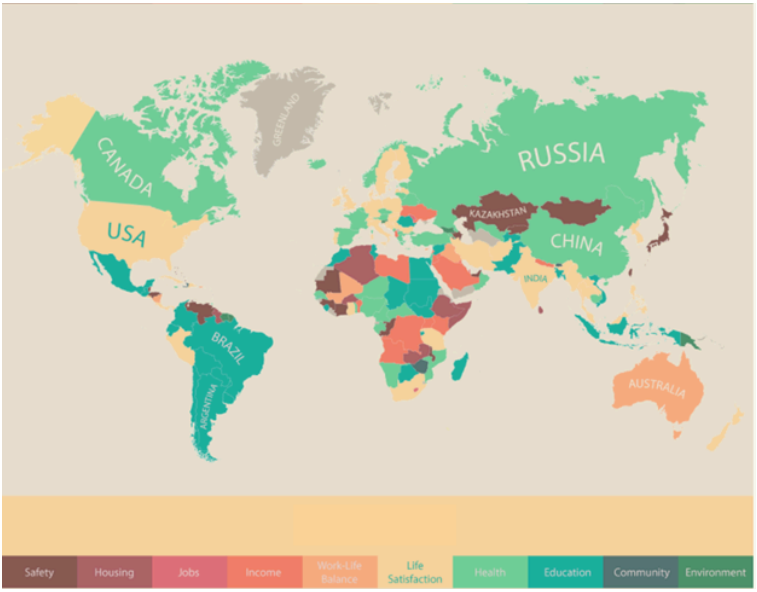

FIG 5 – Number one priority of respondents, mapped by country, 2011-2014. Organization for Economic Co-operation and Development, 60 000 responses.

Despite the small sample size (100 000 among ~8 billion), what can be seen from this map is that the priorities of geographically distinct populations are variable. For example, Brazilian respondents prioritize education, health and safety while the Indian respondents

value life satisfaction, health and income. Engineering projects that seek to embody the priorities of these geographically distinct groups of respondents would need to take into account the locality of belief and values. The Japanese and Indian respondents could discuss and justify their priorities with one another, but there is no "one size fits all" solution to guide engineering design. Finding project priorities that champion the local culture must be understood through the beliefs and values of local people, with as little assumption and influence from the engineer's beliefs as possible.

Even large organizations like OECD with their resources and reach cannot gather a completely accurate picture of values across geographic regions. And there is a reason why assumptions are an important part of engineering work. Good assumptions allow engineers to undertake successful projects without having the impossibly complex "complete picture". What is important is that the limited resources that are available to engineers are used efficiently. In engineering projects, this can be done by considering Indigenous consultation protocol as well as aboriginal and treaty rights for the locality affected by engineering work.

Step Three – Respecting Indigenous Governance in Engineering Projects

As reaffirmed by the Canadian Constitution Act of 1982, Aboriginal people in Canada have distinct rights flowing from their status as the original peoples of Canada. These include:

- Aboriginal title (ownership rights to land)
- rights to occupy and use lands and resources, such as hunting and fishing rights
- self-government rights

- cultural and social rights

These rights vary from group to group, and also include the duty of the Canadian Government to consult, and where appropriate, accommodate Indigenous groups when it considers conduct that might adversely impact potential or established Aboriginal or treaty rights. This duty is affirmed by several cases in the Supreme Court of Canada as well. (Government of Canada, 2019)

Considering the unique relationships and histories of Indigenous communities in Canada, it can oftentimes be difficult to source information on appropriate consultation of communities, since Indigenous governments have pre-existing consultation and accommodations protocol. The Aboriginal and Treaty Rights Information System (ATRIS) is a useful tool for engineers who seek to respect Indigenous governance in their engineering work.

The Aboriginal and Treaty Rights Information System (ATRIS)

ATRIS is a Web-based, geographic information system intended to help users identify the location of Aboriginal communities and display information pertaining to their potential or established Aboriginal or Treaty rights. ATRIS provides access to narrative records and maps that can be used to assist governments, industry and other interested parties in determining their consultation obligations and in carrying out their consultation research. In particular, ATRIS provides users with up-to-date information (both site-specific and general) on treaties and agreements, claims and assertions, court cases and decisions, and consultation related information and links narrative records with their specific geographies on the interactive map of ATRIS, enabling users to locate Aboriginal groups, in relation to a specific project area, for

instance, and to know what their respective established or asserted rights are. A guide for research within ATRIS can be found here.

How Can ATRIS Be Used in Decolonization of Engineering Work?

ATRIS is a valuable resource for engineers as it provides a wealth of community specific information that can guide and frame consultation at the pre-consultation stage. This is one of many sources of information that can be immensely useful in pre-engagement, to ensure that you have a strong grasp of publicly available information of the community. Since many Indigenous community leaders, Elders and administrators take on a variety of roles and responsibilities, pre-consultation research demonstrates an appreciation for cultural, legal and historical context. Also, remember that the information presented on ATRIS reflects the current state of the land, and titles and land claims can and will change over time. Do your best to stay updated on the land politics of the region(s) you are working in.

Other sources of information to consider in the pre-consultation stage:

- The websites and information of communities
- Colleagues who have worked with or consulted with communities in the area
- The databases and records of other government departments and agencies, provinces and territories
- Traditional Use Studies, for example, those prepared in the context of Environmental Assessments
- Press coverage and public statements, in which Aboriginal groups have asserted rights

A Note on Working Alongside Elders

In many First Nations, Métis and Inuit cultures, Elders and community leaders play a respected, vital role in knowledge keeping and decision making. Oral histories continue to be a cornerstone of Indigenous ways of knowing, where beliefs, values, worldviews, language and ways of life are transmitted through storytelling and oral lessons. Having a wealth of lived experiences, Indigenous Elders are often a strong reference point for community beliefs, practices and values. They are often recognized within their communities through a formal community selection process.

The importance of Elders is emphasized across virtually all cultures maintaining an oral tradition and often fulfilling knowledge roles in a particular domain of traditional knowledge, for example as traditional midwives, herbalists, ceremonialists, orators and advisors. Elders generally do not set fees when asked to teach and share, but it is customary for the person making a request to compensate elders for their services. The amount and kinds of gifts that are shared are indicative of the value assigned to the service. (Council on Aboriginal Initiatives, 2012).

Many elders today are facing commitment overload, as traditional knowledge is sought after in a variety of contexts in health, culture and educational institutions. In many communities, it is considered contrary to traditional ceremonies, opening prayers, and land acknowledgements.

It is important to discuss if it is appropriate to include Elders in the consultation process on a case-by-case basis. If you do think it is important for you to include an Elder in the process, be able to articulate *why* you want to work with Elders so that you can be completely transparent. In your first meeting with the community, you will need to be able to clearly lay this out and provide adequate rationale.

Lesson Summary

Lesson Plan – Student Takeaways

A summary of the lesson can be found below:

Knowledge

- Critique personal, local and professional enforcement of colonial priorities across cultural boundaries
- Defend Indigenous legal and social authority in the consultation process

Skills

- Identify The Aboriginal and Treaty Rights Information System (ATRIS) system to access local consultation considerations.

Attitudes

- Relate engineering practice to its local context through the practice of epistemic equality

Downloadable Files

Downloadable Lecture Notes

Lecture Notes for Module 3 (Download)

Additional Resources

Code of Ethics: Engineers & Geoscientists British Columbia. (n.d.). *Code of Ethics*. Retrieved from https://www.egbc.ca/About/Initiatives-and-Consultations/Code-of-Ethics

Friesen, M.R. & Herrmann, R. (2018, December 12). Indigenous Knowledge, Perspectives, and Design Principles in the Engineering Curriculum. *Proceedings of the Canadian Engineering Education Association (CEEA) Conference*, June 3-6, 2018. DOI: https://doi.org/10.24908/pceea.v0i0.12964

Local vs Global Design: Currie, S. (2018, July 2). *Global and local design. What's the difference?* i3digital. Retrieved from https://i3digital.com/insights/global-and-local-design-what's-the-difference

Treaty Information and Crown Consultation Process: Indigenous and Northern Affairs Canada (https://www.canada.ca/en/indigenous-northern-affairs.html)

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Government of Canada. (n.d.). *ATRIS – Search*. Retrieved from https://sidait-atris.aadnc-aandc.gc.ca/atris_online/Content/Search.aspx

Indigenous and Northern Affairs Canada. (2019, April 16). *Government of Canada and the duty to consult*. https://www.aadnc-aandc.gc.ca/eng/1331832510888/1331832636303

Organization for Economic Co-operation and Development (OECD). (n.d.). *Better Life Index*. Retrieved from http://www.oecdbetterlifeindex.org/responses/#CAN

Media Attributions

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Module 3 - Sample Assignment & Rubric

This page outlines the assignment students are to complete for this module. Included, you will find:

- Student learning objectives
- Assignment details and introduction
- Assignment deliverables
- Assignment rubric

A downloadable file of the assignment can be found at the bottom of this page.

Learning Objectives

Assignment – Student Objectives

After the completion of the assignment, you will be able to:

Knowledge

- Critique personal, local and professional enforcement of colonial priorities across cultural boundaries
- Defend Indigenous legal and social authority in the consultation process

- Produce a strategy to champion Indigenous values and knowledge in an engineering project (purpose, preparations, research and knowledge gaps)

Skills

- Use the Aboriginal and Treaty Rights Information System (ATRIS) system to access local consultation considerations.
- Articulate the connection between personal, communal and professional values
- Identify intercultural knowledge gaps

Attitudes

- Relate engineering practice to its local context through the practice of epistemic equality
- Act transparently when outlining the purpose and knowledge gaps when creating a knowledge strategy document

Assignment – Setting the Stage

In the lecture, we discussed the necessity of values and beliefs on a personal, communal and professional level. These values and beliefs were shown to vary from place to place. The OECD global priority survey showed us for example that Brazilian respondents prioritize education

while the Indian respondents value life satisfaction most. Personal values influence our engineering work, and our own values may be in conflict with the beneficiaries of our engineering project. So, engineers should become familiarized with the process of identifying values, beliefs and priorities.

In this assignment, you will identify and discuss some of your own values and priorities in the *self-reflection* section, and become familiar with the values of Indigenous people affected by your engineering work through the development of a *knowledge strategy document*.

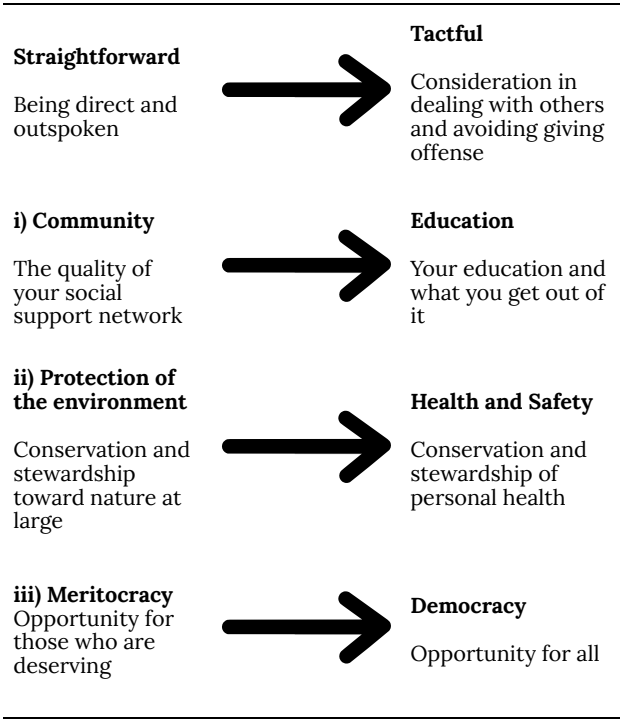
Assignment Details

Self-Reflection

Consider the value scales i), ii) and iii) below. Mark a symbol along the each of the sliding scales, with proximity to one side denoting increased importance to that value or trait:

1. What value is more important to you? Please mark the importance with an x
2. What value do you believe is more important to the people in your local community (town or city)? Please mark the importance with a circle
3. What value do you believe is more important to professional engineers in British Columbia? Please mark the importance with a triangle

4. Optional: Compare your responses for 2) and 3) with a classmate. If your responses are different, discuss how your interpretation of local and professional ways of knowing affect your decision-making.



Answer the following questions, each in less than three sentences:

1. Is a particular value priority universally self-evident? For example, can you empirically justify valuing community over education?
2. Have you ever experienced "culture shock" when integrating into a group with different values? How was the transition? For example, during integration into UBC's academic culture.
3. How can an engineer understand and incorporate appropriate

local values in their work?

Knowledge Strategy Writing

Draft a 3 page (12 pt. font, double spaced) knowledge strategy for an Indigenous community or business local to your project. Compilation of this information will provide you with the baseline understanding of community necessary to begin respectful engagement. The knowledge strategy will include the following sections:

1. Purpose: What do you want to achieve with the people, businesses or communities you want to engage?
2. Preparations: What does your group/business need to do in order to get ready for these engagements and relationships? What group values are important to highlight and discuss during your first meeting?
3. Research: Acquire some background knowledge of three features of the community or business, such as

    - Community History
    - Community Profiles & Statistics
    - Traditional activities (fishing, hunting and gathering)
    - Spiritual practices
    - Governance (tribal affiliations, hereditary leaders, band council)
    - Community priorities
    - Ways of knowing

4. Knowledge gaps: Prepare at least five questions to ask a community representative, to strengthen

    - intercultural dialogue and engagement
    - understanding of social context including understanding

    - the community's values and ways of conducting business
    - your group's ability to design while considering social impact

Assignment Deliverables

You will submit one PDF document which contains:

1. Your responses to the self-reflection section
2. A three page knowledge strategy

Guiding Questions for Success

- How does knowledge strategy development relate to the assignment learning outcomes?
- Are you aware of your personal, local and professional values, and how they guide your decision making process?
- What important knowledge are you missing in your community research? How would you plan on gathering that information in a full-scale engineering project?

Useful Research Resources

The following links may be useful to begin your research:

- Treaty Information: Aboriginal and Treaty Rights Information System
- First Nations Profiles: First Nation Profiles Interactive Map
- Indigenous Self-Government: Self-Government Overview
- Territory maps according to Indigenous nations themselves:

Native Land
- Indigenous Languages Dictionary: First Voices
- Engagement Process: Canadian Construction Association Indigenous Engagement Guide
- Indigenous Businesses in Canada: Indigenous Business Guide

These resources should be supplemented with community specific sources as well, such as community websites and colleagues who have worked with or consulted with communities in the area.

Rubric

A sample rubric to evaluate your students' assignments is found below. Feel free to download and adapt the rubric to match your assessment procedures (i.e. changing weights, etc.).

Benchmark Grade	Articulation of relationship between personal communal and professional values (10%)	Purpose section in the knowledge strategy (20%)	Preparations and knowledge gaps sections in knowledge strategy (30%)	Research section in knowledge strategy (30%)	De Fo (2
100%	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	Student leadership: advanced skills and approaches researched and implemented above and beyond standard expectations.	St le ac sk aa re an im ab be st ex

Benchmark Grade	Articulation of relationship between personal communal and professional values (10%)	Purpose section in the knowledge strategy (20%)	Preparations and knowledge gaps sections in knowledge strategy (30%)	Research section in knowledge strategy (30%)	De Fo (2
90%	The relationship between personal, communal and professional values are articulated in a clear, thoughful and self-reflective manner. The content is also justified based on lecture content and additional insight that demonstrates a high level of introspection on values and beliefs.	The purpose section provides excellent reasoning for engaging with external collaborators, and and does so with clear and deliberate consideration of external partner needs and social context.	The preparations demonstrate a clear, detailed and nuanced understanding of intercultural engagement. All questions in the knowledge gap section are not adequately linked to strengthening intercultural dialogue, understanding social context or designing with social impact. The questions demonstrate a particularly detailed understanding values, beliefs and context local to the Indigenous collaborators.	The research section outlines accurate, detailed and traceable background information on the Indigenous group of interest, fostering a sense of mutual respect, acknowledgement and interest between the parties.The topics of research that were selected are selected in such a way that each research topic is demonstrably pertinent and can be integrated into the project methodologies (for example the design cycle or in communication styles)	Al ex wo fo as in as ou

Benchmark Grade	Articulation of relationship between personal communal and professional values (10%)	Purpose section in the knowledge strategy (20%)	Preparations and knowledge gaps sections in knowledge strategy (30%)	Research section in knowledge strategy (30%)	De Fo (2
70%	The relationship between personal, communal and professional values are articulated clearly, but may lack connection to student\] responses in the sliding scales or strong justification.	The purpose section provides strong reasoning for engaging with external collaborators and does so with some consideration of external partner needs and social context	The preparations address the scope and detail required to prepare the student group for intercultural engagement. All of the questions in the knowledge gap section are linked to to strengthening intercultural dialogue, understanding social context or designing with social impact.	The research section outlines accurate, detailed and traceable background information on the Indigenous group of interest, fostering a sense of mutual respect, acknowledgement and interest between the parties.	M ex wo fo as in as ou wi co m
50%	The relationship between personal, communal and professional values is articulated, but reasoning is and fragmented. The result is a fail to connect all three types of values.	The purpose section provides weak reasoning for engaging with external collaborators, or does so with inadequate consideration of community needs and social context.	The preparations section inadeqately represents the scope and detail required to prepare the student group for intercultural engagement. Some questions in the knowledge gap section are not adequately linked to strengthening intercultural dialogue, understanding social context or designing with social impact.	The research section partially outlines accurate, detailed and traceable background information on the Indigenous group of interest, leading to potential miscommunication during initial engagement.	Fo ex as in as ou so fo

Benchmark Grade	Articulation of relationship between personal communal and professional values (10%)	Purpose section in the knowledge strategy (20%)	Preparations and knowledge gaps sections in knowledge strategy (30%)	Research section in knowledge strategy (30%)	D Fo (2
0%	The relationship between personal, communal and professional values has not been clarified or articulated, through lack of coherence or missing information.	The purpose section is not an approprate way to introduce proposed goals to internal or external collaborators within the group	The preparations section inadeqately represents the scope and detail required to prepare the student group for intercultural engagement. The knowledge gaps section outlines questions are either inappropriate, irrelevant or counterproductive to establishing collaboration.	The research section does not provide accurate, detailed and traceable background information on the Indigenous group of interest, leading to inadequate baseline knowledge to begin engagement.	Fo ex as in as ou ig ur

Downloadable Files

Downloadable Assignment

Module 3 Assignment (Download)

EVALUATIONS

A team of researchers at UBC is currently investigating the effectiveness of the reconciliation+design suite of resources. If you choose to implement one or several modules into your course, we kindly ask that you have your students fill out the beginning and end of term surveys that follow on the subsequent pages.

Student Surveys

Steps for Implementing Student Surveys

1. At the beginning of the term:
    - Fill out this survey so that we know how you have adapted the Special Core Curriculum for your class
    - Have your students complete the Beginning of Term Qualtrics survey respective to the module of the reconciliation+design curriculum content that you have incorporated.
2. Notify us once your class has filled out the survey by emailing Pamela Wolf at pam.wolf@civil.ubc.ca
3. At the end of the term (or after you finish the special core curriculum module), have your students complete the End of Term Qualtrics survey respective to the year-level of the Special Core Curriculum content that you have incorporated

Survey for Module 1:

- Beginning of Term (Links to an external site.)
- End of term (Links to an external site.)

Survey for Module 2:

- Beginning of Term (Links to an external site.)

- End of term (Links to an external site.)

Survey for Module 3:

- Beginning of Term (Links to an external site.)
- End of term

Additional Readings

Document	Quick Summary	When to Read?
It's Our Time - AFN Tool Kit	"A tool to bring together First Nations and non-First Nations people and foster a spirit of cooperation, understanding, and action". This document was written by the Assembly of First Nations and is a comprehensive document on many topics, like cultural competency, lifelong learning models, residential schools etc	When looking to brought to speed on current practice and perspectives surrounding Indigenous Education in the classroom
TRC Calls to Action	"redress the legacy of residential schools and advance the process of Canadian reconciliation."	A must-read to understand the historical context of the war against Indigeneity in Canada
Knowing Home: Braiding Indigenous Science with Western Science	A practical textbook style document that confronts myths about the "irreconcilable differences" between Indigenous Science and Western Science, including tips and tricks for incorporating Indigenous knowledge into different contexts (on-reserve classrooms, Large public schools in the city, on-the land etc)	If you're feeling unsure about when Indigenous science is appropriate to include in the science classroom setting. This doc also includes plenty of discussion points that would be very useful in Pro-D workshops
United Nations Declaration on the Rights of Indigenous Peoples	"Delineates and defines the individual and collective rights of Indigenous peoples, including their ownership rights to cultural and ceremonial expression, identity, language, employment, health, education and other issues."	When looking to become familiar with the special rights that are held by Indigenous peoples worldwide and when looking to provide concrete and authoritative action on an institutional level. Pointing to high-profile and impactful documents like UNDRIP is a great way to encourage systematic change on an organizational level.

Document	Quick Summary	When to Read?
Understanding by Design	"offers a framework for designing courses and content units called “Backward Design.”"	Useful for developing all types of curriculum by first determining what results you'd like to achieve in the curriculum and working "backwards"
Aboriginal People (As a Social Problem)	This course introduction gives a framing for the political history of Aboriginal people in Canada. It includes definitions of Status Indians, Non Status Indians, The Metis, and the Inuit and outlines a brief history of the relationship between Canada and Indigenous populations.	Works well as an intro/ brush-up on the history of Indigenous peoples in Canada.
Pulling Together: A Guide for Indigenizing of Post-Secondary Institutions	"These guides are intended to support the systemic change occurring across post-secondary institutions through Indigenization, decolonization, and reconciliation. A guiding principle from the Truth and Reconciliation Commission of Canada process states why this change is happening."	This guide is great for curriculum design as well as assignment ideas.
UBC Indigenous Peoples: Language Guidelines	"Version 2.0 of this guide has been produced to help UBC communicators navigate the terminology and meanings associated with this subject in order to produce the best—and most respectful—results, with the recognition that, as time passes, the terminology is subject to change and this guide will need to be refreshed."	This guide provides the current UBC language guidelines for Indigenous peoples in Canada. It also provides links to other sources that you may find helpful.

Document	Quick Summary	When to Read?
INDIGENOUS KNOWLEDGE, PERSPECTIVES, AND DESIGN PRINCIPLES IN THE ENGINEERING CURRICULUM, Marcia R. Friesen and Randy Herrmann	This paper summarizes the University of Manitoba's approach to Indigenizing Engineering curriculum, through their engineering capstone, economy and design courses	For brushing up on other engineering decolonization initiatives in Canada
Engineering Leadership Council Success Stories	These three case studies focus on innovative infrastructure projects. Drawing attention to the Transmission Line Social Impact Case Study, it provides an overview of engagement and partnership with nine Indigenous communities.	These case studies are useful to identify current practice when working with Indigenous communities on large-scale engineering projects.
Who's Land is it Anyways?: A Manual for Decolonization	A collection of essays from Indigenous authors inspired by Arthur Manuel's 2016 speak tour. The diverse list of authors explore various topics around colonization, resistance and reconciliation.	A perfect read for those who would like to get Indigenous perspectives of Canadian history, the ongoing impacts of colonialism and working towards reconciliation.
Indigenous Ally Toolkit	A short colorful pamphlet on being an Indigenous ally. It has basic steps for self reflection, recommendations and helpful definitions and language tips.	A very short introductory pamphlet for those new to the decolonization movement.
Indigenizing the Engineering Curriculum: Some of the Scenery Along the Way	Article by Marcia Friesen for Manitoba Consulting Engineer magazine discussing U of Manitoba's efforts to Indigenize their engineering curriculum. Written from a settler perspective, it is a self-reflection of one's motives and personal accountability.	This is a worthy article for those who have questioned how they can be part of the positive change without disrespecting or minimizing hundreds of years of inequity.

Document	Quick Summary	When to Read?
Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants	Robin Wall Kimmerer's book beautifully describes and contrasts western science and her traditional ecological knowledge. This is an influential work that articulates the struggle Indigenous knowledge systems and their practitioners face in fields which disregard all but western knowledge systems.	This book is a deep dive into Indigenous world views which place an emphasis on the relationship between people and the environment and her personal academic research experiences shed light on the dedication of Indigenous scholars who have persevered in western science institutions.
Indigenous Business Directory	This portal is a public access directory of businesses that are owned and operated by Indigenous peoples in Canada. Users can refine their search with a variety of parameters such as location, company size and primary business activities.	This directory would be very useful for connecting industry examples of decolonization to engineering assignments and course content.
X̲wi7x̲wa Research Guides	X̲wi7x̲wa librarians continually evaluate books, article indexes, websites, and more to find reliable, authoritative information on relevant topics. Research Guides include search strategies for finding resources that are relevant to the multidisciplinary study of Indigenous topics and materials written from Indigenous perspectives.	These research guides are broadly useful to better understanding Indigenous research methodologies, literature and history
Special Core Curriculum on Decolonization (Faculty only)	This is a compilation of decolonization resources & training that are vital to read before implementing the special core curriculum. The special core curriculum is also included in the course. Please email Pamela at pamwolf@civil.ubc.ca to gain access to the course.	Read through the materials if you are interested in incorporating decolonization frameworks into your course(s).

Document	Quick Summary	When to Read?
National Centre for Truth and Reconciliation - Resources	These are recommended reading for a variety of age levels compiled by the National Centre for Truth and Reconciliation at the University of Manitoba	This resource list will be useful is you are looking for age-appropriate content for those interested in diving into the subject of Truth and Reconciliation in Canada.

Glossary

Brave Spaces

A space where participants feel comfortable learning, sharing, and growing, that is inclusive to all. Participants honor each other's experiences and opinions with respect to achieve a place of
understanding, acknowledging that there may be a certain level of discomfort when discussing uncomfortable comments.

colonial

the control or governing influence of a nation over a dependent country, territory, or people.

colonialism

the policy or practice of acquiring full or partial political control over another country, occupying it with settlers, and exploiting it economically

Complex systems

Complex systems have unknown unknowns, so you don't know the framework or the variables. The cause & effect relationships aren't repeated, and the system is only coherent in retrospect.

Complicated

definition

Complicated systems

Complicated systems have known unknowns, like a large system of equations that can be only solved with a matrix. In this case, the cause & effect relationships are separated by

space & time. You can utilize systems thinking to solve these systems.

comprehensive community plan (CCP)

a detailed plan created by and for a First Nations community with the purpose of creating community guidelines on (Government of Canada, 2016)

Decolonization

Decolonization is the process of deconstructing the superiority associated with colonial ideologies and western methods of acquiring knowledge to help create space for Indigenization.

descriptive

Relating to what can directly be observed

elders

a leader or senior figure in a tribe or other group

Empirical

Originating in or based on observation or experience

engagement

an effort to understand someone or something

First Nations

First Nations is a term used to describe Indigenous peoples in Canada (sometimes referred to as Aboriginal peoples) who are not Métis or Inuit

hot button moment

hot button moments

Instances where people's feelings rise (sometimes unexpectedly) to a point that threatens teaching and learning.

ideologies

a system of ideas and ideals, especially one which forms the basis of economic or political theory and policy

Indigenization

The process of incorporating Indigenous “ways of knowing”, ways of learning, technology, guiding principles and knowledge systems into our schools, businesses, governments and institutions.

Indigenize

bring (something) under the control, dominance, or influence of the people native to an area.

Indigenous Peoples

Indigenous Peoples are distinct social and cultural groups that share collective ancestral ties to the lands and natural resources where they live, occupy or from which they have been displaced

Microaggressions

Microaggressions are brief and commonplace daily verbal, behavioral, and environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial, gender, sexual orientation, and religious slights and insults to the target person or group

neocolonial

relating to or characterized by the use of economic, political, cultural, or other pressures to control or influence other countries

observable

Postcolonialism

Postcolonialism refers to the study of a region or culture after colonization has occurred

Prescriptive

Relating to what should or ought to happen

reconciliation

the action of making one view or belief compatible with another

Safe Space

A space that poses to threat of danger, risk, or harm to those within the space.

Simple

Relating to systems that are well defined, and thus, are easily solvable.

Simple systems

Simple systems have known knowns (AKA all the variables are known), so they are solvable. For example, the equation of a line with a known x or y value is solvable. The cause and effects in this system are clear.

System thinking

XXXXX

Systems thinking

An approach to analyzing a problem which involves looking at he relationships between the system's constituent parts.

UNDRIP

United Nations Declaration on the Rights of Indigenous Peoples

United Nations

The UN is an international organization founded in 1945. Currently made up of 193 Member States. It is the one place on Earth where all the world's nations can gather together, discuss common problems, and find shared solutions that benefit all of humanity

Ways of Knowing

A tool used to acquire knowledge.

About the Author(s)

Pamela Wolf is an Assistant Professor of teaching in Civil and Environmental Engineering, at the University of British Columbia. She lives, works and plays on the traditional, unceded, and ancestral territory of the Musqueam people.

Pamela Wolf, P.Eng. obtained her B.A.Sc. (Geophysics) and B.A. (English) from UBC and her M.Ed. (Adult Learning and Cultures of Curriculum) from SFU. Ms. Wolf works at the intersection of communication and design, with a focus on communication for collaboration, the community consultation process, storytelling, and leadership. Previous to her lectureship at UBC, she co-founded and was CEO of the Engineering Leadership Council, whose programs were developed and scaled internationally under her leadership. Ms. Wolf was a board member of the UN Group Earth Charter Cities Canada and is an active leader with Engineers Without Borders. Ms. Wolf has also worked in major capital procurement strategy, negotiation, and facilitating executive decision-making.

Research Interests: Classroom culture in engineering communication and the development of post-secondary curriculum with a special focus on facilitation, collaboration, and decolonization

Versioning History

This page lists major changes to this book with major changes marked with a 1.0 increase in the version number and minor changes marked with a 0.1 increase.

Version	Date	Change
1.0	May 2022	Pressbook created