



Indigenous Land-Based STEM Education

Discussion Paper

Prepared May 2021

actüa™

Youth · STEM · Innovation
Jeunesse · STIM · Innovation





Contents

Message from Actua’s President and CEO	3
Acknowledgments	4
Executive Summary	5
Indigenous Land-Based STEM Education: An Overview	6
Indigenous Land-Based Education	6
Why STEM? Why Now?	6
Making the Connection	7
National Perspective on Indigenous Land-Based STEM Education	7
Opportunities	7
Challenges	9
Building an Indigenous Land-Based Education Plan	10
Collective Impact	12
Successful Practices	15
Case Study	16
Defining Success	16
Calls for Bold Action	17
Conclusion	19
References	20



About Actua

Actua is Canada's largest science, technology, engineering and mathematics (STEM) outreach organization representing a growing [network](#) of over 40 university and college-based member programs. Each year 350,000 young Canadians in over 500 communities nationwide are inspired through hands-on educational workshops, camps and community outreach initiatives. Actua focuses on the engagement of underrepresented youth through specialized programs for Indigenous youth, girls and young women, at-risk youth and youth living in Northern and remote communities.

For more information or to find a network member program near you, please visit us online at www.actua.ca and on social media: [Twitter](#), [Facebook](#), [Instagram](#) and [LinkedIn](#).

A Message from the CEO

Actua was honoured to host seven roundtables and a national forum on Indigenous land-based STEM education in November 2020. We were thrilled and grateful to hear from 100 thought leaders, Indigenous educators, representatives of education authorities, and practitioners of land-based education from Northwest Territories, Alberta, British Columbia, Saskatchewan, Manitoba, Ontario and the Atlantic region.

As we look to create pathways towards the future classroom and ways to engage more Indigenous youth in STEM careers, these important conversations on Indigenous land-based learning, and particularly how this model of learning can prepare Indigenous students for their future roles as leaders and innovators in their communities, was captured and documented in this Indigenous land-based STEM discussion paper.

We hope this discussion paper will serve as a guide to greater recognition and implementation of Indigenous land-based STEM education in schools across the country.



Jennifer Flanagan,
President and CEO, Actua

Acknowledgments

Actua extends our gratitude to the post-secondary institutions who collaborated with Actua in hosting the virtual regional roundtable events and the national forum on Indigenous Land-Based STEM Education:

Aurora College

Carleton University

Dalhousie University

Memorial University

Norquest College

University of British Columbia

University of Manitoba

University of Regina

University of Toronto

University of Victoria

We are also grateful to the University of Toronto for providing technical support.

Thank you to our presenters:

Elder Perry McLeod-Shabogesic Nipissing First Nation Ontario

Alberta - Conor Kerr- Norquest College, Manager Indigenous Relations & Supports

Atlantic Region - Dr. Sylvia Moore Memorial University, Assistant Professor

British Columbia - Soundous Ettayebi, University of British Columbia, Assistant Manager Indigenous Outreach

Manitoba - Dr. Brian Rice- Professor, Dr. Daniel Henhawk- Assistant Professor, University of Manitoba

Northwest Territories - Kelsey Wrightson- Executive Director, Dechinta

Ontario- Mary Wabano - Canadore College First Peoples Centre, Director

Saskatchewan - Dr. JoLee Sasakamoose, Associate Professor University Saskatchewan

National Forum - Pam Damoff- Parliamentary Secretary, Minister of Indigenous Services

Thank you to our facilitators:

Mr. Kelly Lendsay, CEO

Indigenous Works

Dr. Marie Delorme, CEO

The Imagination Group

We are grateful to the Suncor Energy Foundation, the Government of Canada, Future Skills Centre and Imperial for their early and ongoing investments in Actua's InSTEM For-Credit program.

Executive Summary

Aligning Indigenous world views and ways of knowing with Western systems is a fundamental element of reconciliation. Education systems, in particular, play a critical role. Education is fundamental to a child's development and growth and profoundly influences a young person's understanding of themselves and the world around them. It is also central to building the social-emotional skills and technical competencies youth need to become the leaders and innovators of tomorrow.

Yet, for Indigenous youth, their identities, cultures, and perspectives remain vastly underrepresented in Canada's mainstream education system, especially within science, technology, engineering, and math (STEM) education. Previous efforts to reform Western education systems and incorporate Indigenous perspectives into curricula have struggled to make a meaningful and sustained impact due to lack of cohesion across national, provincial, and territorial levels. As a result, Indigenous youth often feel alienated from their education, leading to low self-esteem, low graduation rates, and low-paying jobs.

STEM disciplines, which are now fundamental to present-day society, are rooted in Indigenous Knowledge and have informed Indigenous societies and education since time immemorial. Indigenous land-based education, which takes the classroom out onto the land, is and should be recognized as a powerful resource for learning about STEM when incorporated into in-school, family and community learning. It engages participants in participatory, experiential learning that builds knowledge and fosters curiosity about the interconnections between land and people. Land-based learning also preserves and strengthens Indigenous cultural knowledge, allowing Indigenous youth to see themselves reflected in their education and feel a sense of belonging. When this is achieved, educational outcomes improve. For these reasons, land-based education is a relevant, meaningful, and culturally appropriate way to integrate Indigenous worldviews into mainstream education.

In November 2020, Actua, a nationally recognized voice for STEM education and outreach, invited over 100 Indigenous educators and subject matter experts to seven regional roundtables culminating in a national forum to discuss the benefits, challenges, and opportunities for Indigenous land-based STEM education. This discussion paper presents a compendium of the voices of the participants who attended the virtual sessions. Their commitment to building education systems that truly work for Indigenous people is represented in an assessment of the challenges, possibilities, and bold calls to action that require a collective commitment by all who believe in possibilities for young learners.

Two-Eyed Seeing is “To see from one eye with the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western ways of knowing, and to use both of these eyes together.” (Marshall et al., 2012, p. 335).

Indigenous Land-Based STEM Education: An Overview

“Indigenous people have always known about STEM”.

- Doug Dokis, Director of National Indigenous Youth in STEM (InSTEM) Program, Actua

Since time immemorial, the land has been the classroom for Indigenous peoples. Each successive generation has passed on scientific, cultural, and societal knowledge in a continuum that spans tens of thousands of years. This connection to the land is integral to the physical, mental, social, and spiritual well-being of communities, as is the interconnection of language, culture, and the land with the circle of life.

Indigenous land-based education recognizes this sacred connection and teaches Indigenous ways of knowing by drawing upon the natural world, observation, and stories as a central tenet of educational instruction. Indigenous culture, knowledge and language are also preserved through land-based education.

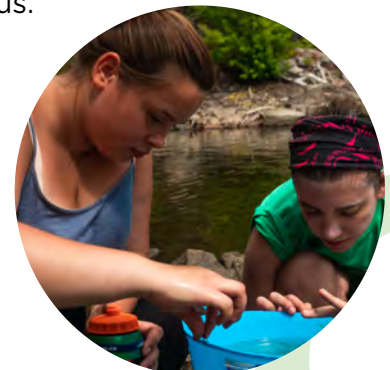
The land has always been the classroom for Indigenous people. Whether it be harvesting an animal for food, plants for medicine, or building a sweat lodge to conduct ceremonies, all of these activities are central in teaching youth critical aspects of life. These aspects of culture are all participatory. The context and content of the teachings are transmitted through repetitive storytelling and personal observation. Contrary to common belief, these aspects of Indigenous culture are embedded with high knowledge of STEM, such as biology, chemistry, mathematical formulas, and engineering design concepts.

Why STEM, Why Now?

STEM education continues to be known as one of the most effective ways to develop the practical in-demand skills needed to prepare youth for any future career path. It's more than just an acronym. It is an approach to learning and teaching that is hands-on, imaginative, and play-based and focuses on critical thinking and problem-solving in real life.

Although STEM disciplines are rooted in Indigenous Knowledge, Indigenous people continue to be underrepresented in STEM. According to the Conference Board of Canada (2020, p.2), about 4 per cent of Canadian adults are Indigenous, but less than 2 per cent of people working in science, technology, engineering, and math (STEM) occupations are Indigenous.

STEM education is essential for all youth. The skills gained through STEM education are no longer optional but critical for jobs of the future. Canada's evolving innovation economy has become dependent on STEM as a key driver of economic growth and a vital defense mechanism against global threats, such as climate change and infectious diseases.



Making the Connection

Land-based education that reflects Indigenous culture and ways of knowing is equal to and often forms the basis of what people today call STEM. Indigenous land-based education offers Indigenous and non-Indigenous students relevant, meaningful, and culturally appropriate ways of connecting Indigenous and Western methodologies, while teaching basic STEM skills.

The intersection between the two worlds of the Western scientific knowledge systems and Indigenous ways of knowing, results in interdisciplinary approaches that enhance student learning. Indigenous land-based education also has significant impacts on identity development in young people and the diverse context in which they situate themselves in the world.

“Land-based learning demystifies science by making it more relevant to what we do everyday and the things around us.”

- Dale Worme

Senior Research Analyst, Science and Math,
Federation of Sovereign Indigenous Nations,
Saskatchewan

A holistic approach to diverse learning methodologies builds self-esteem, self-knowledge, leadership skills, and contextualizes the linkage of the land to humanity. New knowledges can also emerge from the interface between complementary and respectful approaches.

In an era of heightened awareness of environmental impacts of resource development and climate change and the resultant deleterious impacts on the land, land-based learning both educates young people and develops leadership and technical skills to address the most urgent ecological issues facing the world. Encouraging stewardship and care for the land is a strategy to frame STEM concepts related to the issues, places, and things of concern to youth.

National Perspective on Indigenous Land-Based STEM Education

In 2020, Actua engaged over 100 Indigenous educators and subject matter experts in seven regional roundtables culminating in a national forum. Participants discussed the benefits, challenges, and opportunities for Indigenous land-based STEM education, how approaches for Indigenous learners by Indigenous people align with Canada’s commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission’s (TRC) Calls to Action, and how to build an Indigenous land-based education plan. The results of these discussions are summarized below.

Opportunities

Indigenous land-based education engages Indigenous and non-Indigenous students and teachers in authentic, participatory, experiential learning where they discover the interconnections between the land and people, how to build responsible citizenship and the intersection of Indigenous and non-Indigenous ways of knowing. Not only does it increase learning outcomes among Indigenous youth, but it aids reconciliation among communities and society at large. More specifically, land-based education presents the following opportunities:

Empowers Indigenous youth. Students are able to see themselves reflected in the curriculum and know that they have a place in education. They also gain a sense of belonging and pride through validation of their culture and are more likely to pursue STEM careers, evolve into role models and become educators for successive generations.

Unites communities. Indigenous-led land-based learning actively engages communities and builds strong and meaningful relationships. Strong communities lead to resilient youth and constructive social impacts.

Revitalizes languages. Language is integral to understanding the land through an Indigenous lens. Indigenous identity is rooted in language, and revitalization is key to protecting nationhood.

Respects the land. Indigenous worldview is connected to the environment. Land-based programming instills an environmental consciousness in teachers and learners and provides spaces and places to teach about Indigenous people and the connection of the land to all of humanity.

Creates global thinkers. When youth are actively engaged in their education, they build leadership and responsible citizenship skills. Utilizing technology, students can connect to national and international on-the-land learning cohorts.

Provides experiential learning opportunities. Students thrive in an experiential environment. It's an opportunity for them to apply what they've been taught to solve real-world challenges, building their interest in STEM and their understanding of why it's important.

Transfers knowledge. Indigenous-focused learning brings together Elders and Traditional Knowledge keepers with youth to pass on knowledge and teachings about ceremonies, history, traditional medicines, language, and cultural practices.

Develops teachers. Educators who possess knowledge and skills are prepared to engage in inclusive learning spaces and to motivate students.

Develops connections. When non-Indigenous students and Indigenous students learn about Indigenous ways of knowing, bonds are formed, friendships built, and curiosity in seeking knowledge is fostered.

Integrates learning. Culturally relevant pedagogy integrates Indigenous ways of knowing science, technology, engineering, and mathematics with history and art. It's in these instances, STEM becomes STEAM (Science, Technology, Engineering, Arts, and Math).

Key element of reconciliation. Indigenous STEM and land-based education is a tactile, applied, and tangible element of reconciliation.

“Experiential learning goes beyond the textbook.”

- Tom Mugford

Program Development Specialist
for Indigenous Education,
Government of Newfoundland
and Labrador



Challenges

The education gap between Indigenous and non-Indigenous peoples is increasing. Between 2016 and 2019 the gap for post-secondary completion rates grew to 1.7 percentage points to 18.8%; and high school completion for Indigenous students is 14.8 percentage points lower than the non-Indigenous rate ([The National Indigenous Economic Development Board, 2019, p.26](#)). The experience of Indigenous people with education systems in Canada is characterized by colonial-based, segregated, and assimilation-focused constructs that have marginalized Indigenous ways of knowing and being. While some institutions and jurisdictions are making progress in engaging Indigenous people with curriculum development and land-based learning, many challenges remain in the journey to recontextualize education to include Indigenous ways of knowing.

Barriers to meaningful, respectful, and authentic inclusion of land-based education, as identified by roundtable and forum participants, include:

Recognition. The need to continuously prove the value of land-based education to decision makers. Resistance is rooted in a lack of understanding about program value and a reluctance to move away from familiar curriculum delivery. Education systems are not designed to include land-based learning. When viewed through a colonial lens, place-based learning is not viewed as a valid form of education.

“Calling land-based education ‘alternative’ is a barrier.”

- Tom Mugford

Program Development Specialist
for Indigenous Education,
Government of Newfoundland
and Labrador

Capacity. The perception that land-based programs are “more work” rather than different work. Teachers and community members require support from governments, school boards, and administrators. It can be challenging to identify Indigenous people who are subject matter experts, particularly in urban centres. Elders and Traditional Knowledge Holders are stretched to their capacity with education-focused commitments. The loss of Elders and Traditional Knowledge Keepers places stress on the few who remain.

Attrition. Teacher attrition, especially in rural and remote communities, impacts program continuity. A limited number of Indigenous teachers are available in both urban and rural communities.

Resources. Land-based learning can be resource intensive: people, money, transportation, insurance, and the time required of teachers, Elders, and Traditional Knowledge Keepers can all present barriers.

Legitimacy and Accreditation. The constant need to defend the legitimacy of programming to decision makers is draining and requires a unique skillset. Accreditation, reporting, and funding procedures and structures can be overwhelming when these do not align with an Indigenous worldview. Education systems prioritize accredited programs and curricula decisions are based on non-Indigenous models. Some provincial curricula focus on employability skills and do not consider a connection to land-based education.



Mainstream Pedagogy. Some teachers are uncomfortable with pedagogy that does not align with their academic training. They can also feel held back in an environment that does not prioritize or explicitly encourage the creativity, risk-taking or innovation needed to evolve their teaching practices.

Risk. Some resistance stems from concern about the safety or risks associated with education that is not based in the classroom. Insurance providers do not cover and-based activity. Schools and teachers are risk-averse, and policies are rigid.

Resistance. Some parents are resistant to sending their children out on the land in concern for the additional safety risks associated with land-based activity; parent engagement can be challenging.

Funding. The absence of reliable and sustainable multi-year funding, the labour required to obtain funding, and meeting fiscal timelines that do not align with the seasonality of land-based programming is a significant barrier. Sourcing funds for programming, equipment, and compensation of Elders and Traditional Knowledge Holders can be challenging.

“The risk is worth it to do place-based learning.”

- Elena Gould
Director of Education,
Culture and Language ,
Athabasca Tribal Council,
Alberta

Building an Indigenous Land-Based Education Plan

“Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning.”

Article 14.1 United Nations Declaration on the Rights of Indigenous Peoples

A fundamental guiding principle of Indigenous land-based education planning is that it is Indigenous-led. This means that Indigenous peoples are meaningfully and authentically engaged in all aspects of legislation, policy development, programming, curriculum development, and delivery. It means that educators have a strong awareness of Indigenous history, intergenerational issues, and barriers that disproportionately impact Indigenous youth.

Governments must identify land-based learning as a priority and engage Indigenous peoples in developing strategies, goals, action plans, and measures of success. Political will and commitment is key to making land-based learning a reality for every Indigenous student.

Indigenous land-based education planning recognizes that there is a mosaic of Indigenous cultures; a method that may work for one community might be completely different for another. The basis of planning is the land; education is locally relevant, place-based, and designed to meet community needs and available resources.

Other key elements of an Indigenous land-based education plan as recognized by roundtable and forum participants include:

Vision. The envisioned future for Indigenous land-based education planning is most effectively characterized as Indigenous-led, holistic, looks seven generations ahead, and is informed by Two-Eyed Seeing.

Action Plans. Goals cascade into strategic priorities and detailed action plans that identify what, who, and when.

Research. Many communities and institutions, nationally and internationally, have embarked on land-based learning initiatives. Researching successful practices and inviting others to share their expertise and experiences can be helpful.

Commitment and Relationships. Successful land-based education requires the engagement of decision-makers, influencers, funders, educators, and advocates. Organizations and individuals may vary depending on the plan, however there are some whose involvement is critical to the success of land-based programming. Champions must be identified and mobilized to lead the way and help navigate through bureaucracy. Organizations and individuals who need to be involved include:

- Elders and Knowledge Keepers
- Language Speakers
- Regional Coordinators
- Full-time on-the-land Instructors
- School Administrators
- Teachers
- School Boards
- Parent/Guardians
- Youth
- Insurance Companies
- Governments – federal and provincial
- Mental Health & Wellness Providers
- Elected Indigenous Community Leaders
- Community Stakeholders
- Partners
- Media

Communication. Effective communication that meets the needs of all who are engaged in land-based education is key to the successful implementation of the plan. Some communities may want to utilize various forms of media to publicize their approaches and activities.

Spaces and Places. Meaningful land-based learning requires access to the land, approvals where required, and accommodation for access to urban learning spaces.

Programming. This includes curriculum development that is community specific, aligns with available local expertise, and matches activities to the seasonality of on-the-land activities. Programming may require changes to policies and scheduling.

Resources. Committed people, instruction materials, technology, equipment, transportation, curriculum time, and professional development for teachers are all required.

“We need to create something that is contagious.”

- Crop Eared Wolf

NPES Assistant Principal/
Student Success Coordinator,
Piikani Board of Education,
Alberta

“Not just the Indigenous, but all students, are in awe of Elders when they are out on the land. The skills they develop are one thing, but the stories and experiences they are hearing are more important because it brings to life the people, culture and the land.”

- Ed Lippert

Superintendent,
Yellowknife Education District NO. 1,
Northwest Territories

Financing. Reliable funding ensures that land-based education is accessible and sustainable. Education institutions require financial backing from the government.

Risk Management. The safety of Elders, Knowledge Keepers, students, and teachers is paramount. This requires processes, protocols, and collaboration with legislation, policy developers, and insurance providers.

Assessment. Indigenous land-based education requires approaches to evaluation and program assessment that are informed by Indigenous ways of knowing and are developed and led by Indigenous people.

“In some cases, program delivery will need to be adapted to coincide with community harvesting cycles.”

- Roundtable Participant

Collective Impact

The concept of collective impact provides a framework for organizations and individuals to come together to positively impact the lives of students. The idea is that when everyone works together around a common vision and goals, complex and seemingly insurmountable problems can be solved, and innovative approaches to student outcomes can be developed. A collective impact approach includes the participation and collaboration of many organizations, entities, and individual, some of which include:

“We are not in this canoe alone. There are other people who can help us and join in this journey.”

- Kimberly Nault Brown

Alberta Métis Education Council,
Rupertsland Institute,
Alberta

ORGANIZATIONS, ENTITIES, AND INDIVIDUALS	ROLES AND CALLS TO COLLECTIVE IMPACT ACTIONS
LEGISLATIVE AND OVERSIGHT BODIES	
Governments	All levels of governments are called upon to commit to a long-term vision and the political will to enact legislation. Governments are further called upon to provide long-term, sustainable financial support and support for use of public spaces for Indigenous land-based education.
Child Protection Agencies	Students in care have fewer educational options, particularly if they are living in urban settings. Agencies are called upon to link students to communities, to land-based-education opportunities, and to provide support for students living outside of communities.
Provincial and Territorial Education Systems	Accreditation for Indigenous land-based education is a continuum that connects secondary and post-secondary education. Programming must encompass student learning and accreditation throughout their academic journey. Teachers, at all levels, require ongoing professional development to build their capacity and competencies.

ORGANIZATIONS, ENTITIES, AND INDIVIDUALS	ROLES AND CALLS TO COLLECTIVE IMPACT ACTIONS
ACADEMIC INSTITUTIONS	
School Boards	Land-based learning requires financing and logistical support. School boards are called upon to allocate budgets to support the people, materials, and logistics required for effective Indigenous land-based education. School boards are further called upon to meaningfully engage Indigenous Elders, Traditional Knowledge Holders in curricula development and approval. Further, school boards can collaborate with insurance companies to address risk issues associated with taking students and teachers on-the-land.
School Administrators	To meaningfully incorporate Indigenous land-based learning and Indigenous STEM into the curricula, school administrators are called upon to address policy, budgetary, and logistical issues.
Teachers	Through professional and personal learning and development, teachers can develop the skills, knowledge, and competencies required to provide effective leadership in the classroom and on the land. Teachers are called upon to proactively engage with their students and Indigenous communities to connect classroom learning to land-based education.
Post-Secondary Institutions	Pre-service teachers require confidence and capacity before being required to address Indigenous knowledge systems in the classroom. Post-secondary institutions are called upon to encourage, and provide opportunities for teachers to learn and experience Indigenous land-based STEM education.
COMMUNITIES	
Elders and Traditional Knowledge Keepers	The community members who generously share their language, culture, and traditional knowledge continue to be meaningfully engaged in educating young people. These critical individuals are teachers, guides, and champions of Indigenous land-based education.
Parents and Guardians	Children learn most effectively when they are supported at home. Parents and guardians are called upon to fully engage in their children's education by chaperoning on-the-land trips and lending their knowledge, support, and expertise to teachers and students.

ORGANIZATIONS, ENTITIES, AND INDIVIDUALS	ROLES AND CALLS TO COLLECTIVE IMPACT ACTIONS
COMMUNITIES (continued)	
Students	Learners today evolve into educators in the future. Students are called upon to take an active interest in their heritage through the lens of Indigenous land-based learning; and are further called upon to be mentors and role models for other students.
Community Members	Communities are a significant resource for students, teachers, and schools. Community members are called upon to support and engage in Indigenous land-based learning by volunteering, championing, supporting, and fully engaging in the education journey with young people.
INDIGENOUS LEADERSHIP	
Indigenous Directors of Education	Many communities have administrative leaders who direct education policies and processes. Indigenous Directors of Education are advocates and leaders in community education. These critical individuals are called upon to continue their good work with provincial and territorial education ministries on curriculum design and implementation.
Community-Elected Leaders	Indigenous voices must be elevated to meaningfully address the gaps in Indigenous land-based education. Indigenous elected leaders are called upon as advocates and champions with government and territorial bodies to remove bureaucratic roadblocks.
Regional and National Indigenous Organizations	The regional and national Indigenous organizations are called upon as supporters and advocates of Indigenous land-based education. These organizations are a rich source of subject matter expertise and data, and are in a strong position to lobby all levels of government.
GENERAL PUBLIC	
Private Landowners	Place-based learning is a critical component of Indigenous land-based education. Private landowners are called up to collaborate with communities and schools to provide access to places and spaces and to be partners in education.

Successful Practices

Land-based learning initiatives across the country are revitalizing cultural practices by transferring Indigenous understandings, skills and philosophies to youth. These initiatives continue to grow and expand with increased demand and interest in land-based education. Individuals and families participating in these initiatives are becoming stewards of their environments as they build a sense of pride in history and culture and share their knowledge with others.

Participants in the November 2020 regional roundtables and national forum discussed programs and practices in their communities that provide examples of how Indigenous land-based education can truly make a difference in the lives of young people, their communities, and for all people living in Canada. Programs of all shapes and sizes are engaging youth in interactive and culturally relevant activities. These activities teach practical STEM skills, such as on-land survival techniques, smokehouse construction, traditional healing practices and hunting techniques.

Other examples of culturally relevant STEM activities used today include:

- Identifying how Indigenous art incorporates math and geometric patterns
- Using engineering and design skills to build traditional structures
- Exploring the science and mathematics of quill art boxes, including understanding how to analyze the structure: circle, circumference, space, and patterns
- Utilizing engineering principles and prototypes focused on how Indigenous people developed tools
- Teaching the intersection between medicine and engineering e.g., the processing of birch oil by boiling the bark in a wood basket
- Observing a salmon tank to learn about the fish and how to raise them
- Learning about the engineering required to build a canoe or how a beaver builds a dam

“When science can validate our learnings, and when it is validated on both sides, this is reconciliation.”

- Christopher Googoo

Chief Operating Officer,
Ulnuweg,
Nova Scotia

“Normally when I come to school, I feel like I have to leave being Dene at the door. When I do these programs, I can be Dene all day.”

- Student

Paraphrased by
Esker Norman
Director, Black Spruce Education,
Northwest Territories



Case Study: Actua's National Indigenous Youth in STEM Program

Participants in the November 2020 Regional Roundtables and National Forum recognized [Actua's National Indigenous Youth in STEM \(InSTEM\) program](#) as an example of a national program empowering youth with the skills and confidence to pursue STEM education and careers through and-based education. The program represents a unique, respectful collaboration among over 200 Indigenous communities, post-secondary institutions across Canada, and industry partners. It is led by Doug Dokis, an Anishinabe member of the Dokis First Nation in Northern Ontario, who has over twenty five years of experience in Indigenous education, and has been shaped and influenced by hundreds of Indigenous Elders, Knowledge Keepers, educators and thought leaders who have shared their perspectives on STEM. At the program's core is the premise that Indigenous people have always known about STEM.

Each year, Actua's growing network of post-secondary institutions hires hundreds of undergraduate students in STEM studies and engages high school student volunteers and interns, who deliver its for-youth-by-youth STEM outreach programming. Over 35,000 First Nations, Inuit and Métis students in grades K-12 are engaged annually in culturally relevant land-based learning opportunities, such as school workshops and week-long summer day camps that connect Indigenous ways of knowing to Western STEM and related careers.



Actua recently introduced for-credit land-based learning opportunities into the program. Participants have the chance to earn high-school credits, serve as role models and mentors to younger students and benefit from leadership and peer-networking experiences that increase their skills and confidence to advance their fields of study. To date, Actua has granted 700 credits to Indigenous students across the country, directly contributing to credit accumulation and ultimately improved graduation rates for Indigenous students. Working in collaboration with Indigenous communities to identify educational and cultural priorities, Actua's InSTEM team supports the alignment of local Indigenous knowledge and STEM learning activities on the land in the community. Through this community-knowledge-first approach, Indigenous youth see the value of their own inherent cultural knowledge and the direct relationship to the STEM learning they are receiving within the classroom.

Actua's National InSTEM model supports Indigenous communities' position that land-based learning can preserve and strengthen cultural knowledge and build confidence among Indigenous youth to shape the social and economic prosperity of their communities and Canada as a whole.

Defining Success

Success is a Canadian education system that fully recognizes, acknowledges, and integrates Indigenous world views. An ideal state includes a society where Indigenous land-based education is recognized as a valid form of education, particularly STEM education integrated into mainstream curricula.

The system would adopt a collaborative, consultative methodology to enact real systemic change, rather than legislating change from the top-down, recognizing that change must happen one school, one community at a time and is driven by Indigenous educators and knowledge. Capacity would exist, so educators are comfortable with new pedagogical approaches, and more Indigenous teachers would be engaged in mainstream education. Evaluation, assessment, and accreditation systems would also be in place to recognize land-based learning as equal to classroom and book learning.

Most importantly, Indigenous youth would be able to attend Canadian schools without sacrificing their cultural identity and confidently gain the skills needed to be successful.

Calls for Bold Action

For far too long Indigenous peoples have faced education gaps and an indisputable underrepresentation in STEM. Integrating Indigenous world views and ways of knowing within mainstream education is not only critical to improving Indigenous participation and leadership in these disciplines, but also improving social and economic outcomes for everyone in Canada. **The time for change is now.**

Reconciliation requires support for all aspects of land-based learning; meaningful progress requires financial investment in the future. The cost of doing nothing is exponentially greater than acting today.

“When you get on the land it is very clear who has the knowledge to “keep you alive” Land-based education helps us see knowledge around us that is held in community and in family members.”

- Kelsey Wrightson
Director,
Dechinta Centre for
Research and Learning,
Northwest Territories

Actua’s 2020 regional roundtables and national forum included discussions on ways to meaningfully incorporate Indigenous land-based STEM into curricula. The following are the roundtable participants’ recommended calls for bold action:

Calls to Governments and Educational Oversight Bodies:

- Legislate Indigenous land-based education.
- Provide multi-year, sustainable funding.
- Deliver training to government leaders to develop an understanding of the importance of land-based learning initiatives.
- Integrate land-based education into curricula and accredit programs so that “the land is seen as having the same validity as a classroom and textbook.”
- Create a new category of curricula for experiential land-based learning.
- Create a national curriculum that could be modified to suit regions and localities.



Calls to Elementary, Secondary, and Post-Secondary Institutions

- Develop partnerships with government, industry, and organizations to develop learning places and spaces.
- Create virtual reality experiences for students who do not have access to the land
- Invest in Indigenous instructors, Elders, and Traditional Knowledge Holders.
- Open dialogues with relevant audiences to review the Insurance Companies Act to better reflect the benefits of land-based experiences for Indigenous youth and to collaborate on policies and quality assurance practices that work for land-based programming.
- Collaborate with unions to make space to hire Traditional Knowledge Keepers outside of collective agreements.
- Create space for land-based education in preparing teachers to engage with students and communities and help student teacher cohorts to develop expertise that can be taken into the classroom.
- Accredite Knowledge Keepers as part of university standards.
- Encourage the Council of Ministers of Education, Canada to commit to the inclusion of Indigenous land-based pedagogy as part of the CMEC Indigenous Education plan 2019-2022 to ensure that Indigenous education by and for Indigenous people is a key component in every province and territory.

“An open source course for teacher training outside of a specific institution that highlights successful practices and is formed out of the national knowledge base of land-based and InSTEM Education that school boards and teachers can access would certainly help grow the knowledge base in all of our schools.”

- Erica Thompson

7-12 Coordinator,
Indigenizing Education and Literacy,
Beaufort Delta Divisional
Education Council,
Northwest Territories

Calls to Communities

- Embed land-based education into comprehensive community planning, green energy, extraction industry; work with government on building community capacity.
- Advocate for commitments from provincial educational authorities to prioritize land-based learning in curricula; this requires a cohesive Indigenous advocacy, supported by data, to demonstrate results.

Calls to Elementary, Secondary, and Post-Secondary Institutions

- Develop partnerships between national and regional Indigenous organizations and post-secondary institutions.
- Develop a national council focused on content, assessment, training, and research.
- Keep the conversation going to address barriers, engaging key players, and to bring voices together at a national level.

Conclusion

The voices of over 100 senior Indigenous educators and subject matter experts, including non-Indigenous educators and government representatives, were heard at Actua's regional roundtables and national forum in November 2020. The messages from across the country were consistent and are reinforced by key calls to action stated by the Truth and Reconciliation Commission.

Now it is time for meaningful action. The national consensus of Indigenous educators, post-secondary institutions, school boards, students, and communities is that Indigenous land-based education is a tangible and critically important element of reconciliation.

The education system that has existed for 150 years is consistently failing Indigenous children. We know that students who participate in Indigenous on-the-land learning perform better academically, both outside and inside the classroom. We know that these students form strong relationships with their teachers, Elders, Traditional Knowledge Keepers, and other students. We know that these students are engaged, want to do their best, and develop self-confidence and leadership skills.

It's time to break down barriers to education through the purposeful and meaningful inclusion of Indigenous land-based STEM education in every student's learning journey.



References

Bartlett, C., Marshall, A., & Marshall, M. (2012, August). Determinants of Indigenous Peoples' Health. Canadian Scholars' Press Inc.

The Conference Board of Canada. (2020, June). Incorporating Indigenous Cultures and Realities in STEM. https://fsc-ccf.ca/wp-content/uploads/2020/07/24559_10697_incorporating-indigenous-culture-and-realities_primer.pdf

The National Indigenous Economic Development Board. (2019, June). The Indigenous Economic Progress Report. <http://www.naedb-cndea.com/wp-content/uploads/2019/06/NIEDB-2019-Indigenous-Economic-Progress-Report.pdf>

United Nations. (2007, September). United Nations Declaration on the Rights of Indigenous Peoples. https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf