The Conference Board of Canada

In partnership with Future Skills Centre

Incorporating Indigenous Cultures and Realities in STEM

Primer | June 2020

Future Skills Centre

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The Future Skills Centre was founded by a consortium whose members are Ryerson University, Blueprint ADE, and The Conference Board of Canada.

If you would like to learn more about this report and other skills research from FSC, visit us at fsc-ccf.ca or contact info@fsc-ccf.ca.

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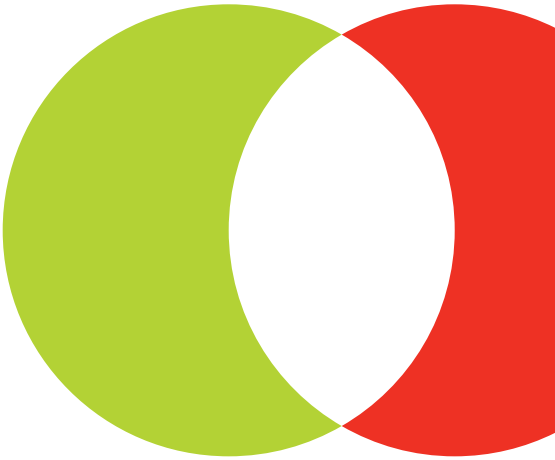

Key findings

- When educators use a culturally responsive curriculum—one that bridges Indigenous ways of knowing with Western science—Indigenous students are more engaged and perform better.

- Organizations across Canada are using eight broad strategies to increase Indigenous representation in science, technology, engineering, and mathematics (STEM) fields. Many initiatives attempt to address cultural differences.

- Strategies that target Indigenous elementary and secondary students include reforming STEM curriculum in public and Indigenous-controlled schools, and outreach activities to engage Indigenous students in STEM.

- Strategies that target Indigenous learners in post-secondary education (PSE) include comprehensive support services for Indigenous PSE students, indigenization of mainstream PSE institutions, and the promotion of STEM fields by Indigenous institutes.

- Strategies that target STEM graduates include developing associations for Indigenous professionals in STEM occupations and employer initiatives that prepare Indigenous people for STEM occupations.

More research is needed to understand which of these strategies is having the best impact.

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Addressing STEM inequalities

Indigenous people make up 4 per cent of adults in Canada. But less than 2 per cent of people working in science, technology, engineering, and mathematics (STEM) occupations are Indigenous.[1] STEM occupations provide important and rewarding work. (See Appendix A.) And people in STEM occupations—such as engineers, doctors, and scientists—have political as well as economic influence, and can play strong leadership roles. Indigenous communities want to see more of their members in these decision-making positions.

Advancing reconciliation

Improving Indigenous participation and leadership in key economic sectors such as science, technology, and finance is part of the reconciliation journey. *The Truth and Reconciliation Commission of Canada: Calls to Action*[2] and *United Nations Declaration on the Rights of Indigenous Peoples*[3] both call for educational reforms to ensure Indigenous peoples are accepted as equals in all fields, including STEM. (See "Calls to educational reform.") Investing to improve STEM education for Indigenous learners can be one way of addressing the education gaps that Indigenous peoples face across Canada.

Calls to educational reform

The Truth and Reconciliation Commission's 10th Call to Action includes "improving education attainment levels and success rates" and "developing culturally appropriate curricula."

Article 15.1 of the 2007 United Nations Declaration on the Rights of Indigenous Peoples asserts that: "Indigenous peoples have the right to the dignity and diversity of their cultures, traditions, histories and aspirations which shall be appropriately reflected in education...."

Sources: Truth and Reconciliation Commission of Canada; United Nations.

Informing policy

Our environmental scan of Indigenous STEM initiatives found a large number of organizations in Canada that are working to address STEM inequalities. Educators and program designers need to know which of the strategies that are designed to reflect Indigenous cultures and realities in science and math education are helping Indigenous learners access and succeed in STEM fields. And decision-makers in governments at all levels should understand what strategies will have the best return on investment.

1 Analysis of 2016 Census data. Statistics Canada, "Data Products, 2016 Census."
2 Truth and Reconciliation Commission of Canada, *Truth and Reconciliation Commission of Canada: Calls to Action.*
3 United Nations, *United Nations Declaration on the Rights of Indigenous Peoples.*

Some things are clear

Culture matters

Indigenous people have had their own ways of passing on knowledge for millennia. For instance, where Western science takes a quantitative, compartmentalized approach to understanding nature, Indigenous science leans toward a more qualitative, interrelated approach.[4] Indigenous science also has distinct views about interconnectedness, relationship to space and time, structural authority, and ways of knowing and learning.[5]

When educators make the effort to provide a culturally responsive curriculum that braids Indigenous ways of knowing nature with Western science, Indigenous students are more engaged and perform better.[6] One culturally responsive approach to learning, introduced by Mi'kmaw Elder Albert Marshall, is two-eyed seeing, where students learn to see "from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing."[7]

Educational strategies and content that reflect Indigenous culture and reality in science and math may help more Indigenous learners succeed in STEM fields.[8] Culturally responsive teaching is a pedagogical approach that is "centred on the cultural identity of students, particularly the cultural resources they bring into the classroom from their community."[9] Approaches like this may help all students, educators, and STEM professionals better understand and appreciate Indigenous values, learning styles, and traditional ways of knowing.[10]

Start early

Approximately 450,000 Indigenous students are studying in kindergarten to Grade 12 across Canada.[11] There are a number of transition points where these learners may opt out of STEM educational pathways. (See Exhibit 1.) Indeed, the number of Indigenous students taking and passing STEM subjects starts to drop off early in the education journey. By the time a cohort reaches the end of secondary school, very few Indigenous students have the formal qualifications required to be accepted into post-secondary education (PSE) STEM faculties.[12]

Interventions that support Indigneous learners in the early school years may reach more students. In addition, approaches designed to reach learners later in the STEM journey may build on early approaches to compound the effect on individual achievement. A better understanding of the design and results of all these efforts would help focus future investments.

4 Hogue, *Dropping the "T" From Can't,* 135.

5 Ibid., 23.

6 Sutherland and Swayze, "Including Indigenous Knowledges and Pedagogies in Science-Based Environmental Education Programs"; Snively and Wanosts'a, *Knowing Home.*

7 Marshall, "Guiding Principle—Two Eyed Seeing."

8 Alkholy and others, "Convergence of Indigenous Science and Western Science Impacts Students' Interest in STEM and Identity as a Scientist"; Ezeife, "A Cultural and Environmental Spin to Mathematics Education"; Castellano, Davis, and Lahache, *Aboriginal Education.*

9 Aikenhead, "What's Happening in Saskatchewan?"

10 Snively and Corsiglia, "Discovering Indigenous Science."

11 Canadian School Boards Association—Indigenous Education Committee, *Indigenous Education Structure, Initiatives and Promising Practices,* 4.

12 Personal communication, director, Indigenous access program at a major Canadian university.

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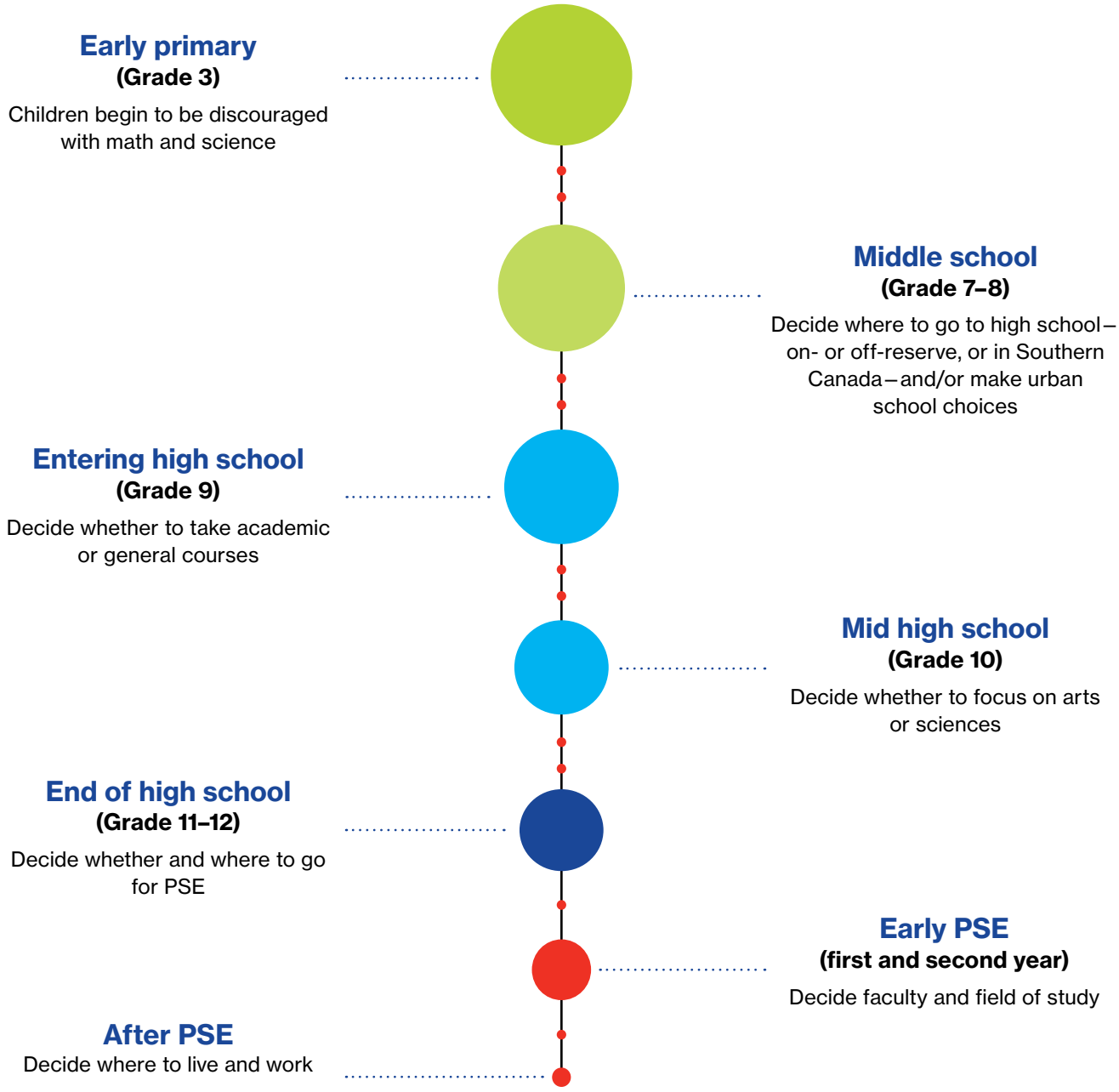
Exhibit 1

The pool of candidates shrinks as learners opt out of STEM subjects



Note: Circle size roughly correlates to the number of students remaining in a cohort at each stage.
Source: The Conference Board of Canada.

Systemic barriers persist

Many systemic barriers stand in the way of Indigenous learners staying in school and getting a good basic education, and make it harder to get into a STEM field. These can include the structure and focus of provincial school curricula, low expectations of teachers, being in care or in the justice system, or attending a remote or rural school. These barriers are often related to social inequality and inadequate resources, as well as racism and cultural conflicts between Indigenous and non-Indigenous societies.

Protective factors help

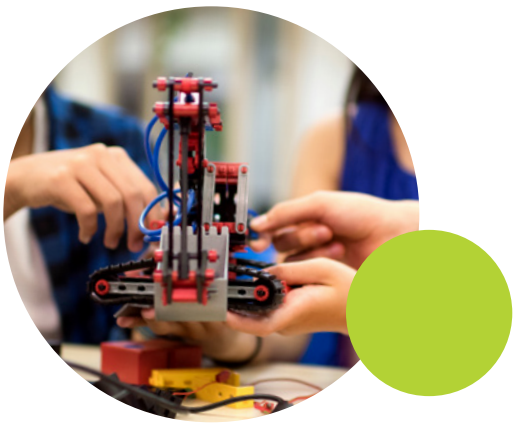
An educational pathway is rarely a straight line. Indigenous learners typically move through many transitions and obstacles as they navigate their way to a certificate, diploma, or degree in STEM. For example, almost 20 per cent of Indigenous people aged 20 to 24 (living off-reserve) have not completed high school.[13] However, more than half (53 per cent) of those who later upgraded went on to get a post-secondary diploma or degree.[14] Each Indigenous student may have unique strengths and supports that help him or her stay on track—or get back on track—throughout their studies.

Family and community support

Indigenous STEM graduates often cite family support as an important reason for their success. Friends can also be an important source of support.[15] Indigenous student associations and support services can become a substitute family on campus for students far from home. Elders-in-residence on campus can play a critical role as "a grandparent away from home" for students separated from family.[16]

Role models

Role models can be an important source of motivation for Indigenous students. For example, when most of their friends have high educational aspirations, young Indigenous people are more likely to complete high school. Likewise, when Indigenous parents have completed high school, their children are more likely to graduate.[17] Associations and institutions also promote Indigenous role models to inspire young learners.



13 O'Donnell and Arriagada, "Upgrading and High School Equivalency Among the Indigenous Population Living Off Reserve," 4.

14 Ibid.

15 Bougie, Kelly-Scott, and Arriagada, "The Education and Employment Experiences of First Nations People Living Off Reserve, Inuit, and Métis," 20.

16 Iqbal, "Why Ontario Universities Are Hiring Indigenous Elders."

17 Bougie, Kelly-Scott, and Arriagada, "The Education and Employment Experiences of First Nations People Living Off Reserve, Inuit, and Métis," 16.

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Inspiring teachers and academics

Individual teachers can give critical inspiration and build confidence.[18]

"My seventh grade science teacher, ... always took the time to guide me and offered encouragement when I wanted to give up going to school. I have loved science ever since."

Myrna Emma Chartrand, profiled Manitoba First Nation teacher[19]

Indigenous student support services

Student support services designed for Indigenous students can be effective at all levels when they bring together academic, financial, mental health and wellness, and cultural resources. Graduation coaches have shown promise coordinating school and community supports to help Indigenous students stay in school through to graduation.[20] Post-secondary Indigenous student support services and counsellors can be crucial enablers of success in universities, colleges, and polytechnics.[21]

Flexible bridging programs

Bridging programs help Indigenous students access PSE through special courses during the summer or over a school year. Participants may be high school graduates with weak grades, or mature students who never completed high school. Learners upgrade their academic skills and earn credits. They also learn study skills, get used to the culture of the institution, and learn about cross-cultural approaches. Other bridging programs help students move from a college diploma into a university program. Programs are often designed for single parents and youth coming from rural and remote communities.

Money matters!

With median incomes for Indigenous people 35.5 per cent below non-Indigenous median incomes, Indigenous families have less money available to invest in education.[22] The federal government's Post-Secondary Student Support Program[23] provides partial funding for Treaty and Status First Nations students and Inuit students. Bursary programs like Indspire[24] and the Verna J. Kirkness Science and Engineering Education Program[25] also help students stay in school and complete their studies.

18 Aikenhead and others, *Enhancing School Science With Indigenous Knowledge.*

19 Aboriginal Education Directorate, "Profiles of Aboriginal Educators."

20 Lessard, *Four Directions First Nations, Métis and Inuit Graduation Coach Approach Dryden High School;* Lessard, "High School Graduation Coach Program Evaluation."

21 Thomas, "Retention of Aboriginal Students in Post-Secondary Institutions in Atlantic Canada."

22 National Indigenous Economic Development Board, The, *The Indigenous Economic Progress Report 2019,* 25.

23 Indigenous Services Canada, "Post-Secondary Student Support Program."

24 Indspire, "About Indspire."

25 Verna J. Kirkness Education Foundation, "Verna J. Kirkness Science and Engineering Education Program."

A typology of Indigenous STEM initiatives

In recent years, many organizations across Canada have established new programs to help Indigenous learners get ahead in STEM fields. However, the effectiveness of these new initiatives is not well understood.

We found more than 100 different programs in Canada that specifically aim to help Indigenous learners succeed in STEM. These programs can be sorted into eight broad strategies for increasing Indigenous representation in STEM. Each strategy falls into one of three periods in the learner's life course. (See Appendix B.) Within each strategy, there are initiatives that attempt to address cultural differences.

Strategies targeting elementary and secondary students

1. Curriculum reform of STEM in public K to 12

In 2015, the Truth and Reconciliation Commission called for more culturally appropriate curricula. Almost all public school jurisdictions in Canada have made some reforms to school curricula to better reflect Indigenous world views. A few specifically target math and science. Some changes are superficial, such as providing optional supplementary teaching resources.[26] More significant reforms mandate Indigenous learning goals in the curriculum, develop Indigenous teaching resources, and train teachers to use the resources in the curriculum.[27] Some initiatives affect a whole province.[28] Others are specific to local school boards.

Example of this strategy:

Pearson Science: Saskatchewan Edition[29]

26 Kabatay and Johnson, "Charting Progress on Indigenous Content in School Curricula."

27 Canadian School Boards Association – Indigenous Education Committee, *Indigenous Education Structure, Initiatives and Promising Practices.*

28 Tippett and Milford, *Science Education in Canada.*

29 Pearson Canada, "Pearson Science."

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2. Curriculum reform of STEM in Indigenous K to 12

There are about 500 on-reserve schools controlled by First Nations. An additional 43 schools are controlled by the Nunavut government. A number of independent Indigenous governments manage their own schools under modern treaty agreements. "Indian control of Indian education"[30] has been the official policy of the Assembly of First Nations since 1972. Similarly, the National Strategy on Inuit Education calls for Inuit control over their children's education.[31] Some Indigenous-controlled schools have developed science and math curricula and teaching materials that reflect their local culture and environment. Broader school initiatives help students succeed at school and graduate, to keep students' options open to pursue STEM subjects in PSE.

Examples of this strategy:

Show Me Your Math[32]
Learning First Peoples Classroom Resources[33]
Métis math program[34]

3. STEM outreach to Indigenous school students

A wide variety of organizations across Canada offer STEM outreach programs for Indigenous youth. Some of these programs are culturally tailored to meet the needs of Indigenous primary and secondary students. Activities are often a summer workshop or camps that can last from a day to a week. Some organizations offer in-class workshops and extracurricular activities during the school year. Innovation, Science and Economic Development (ISED) Canada's CanCode Program[35] and Natural Sciences and Engineering Research Council (NSERC) of Canada's PromoScience Program[36] fund many programs. Private sector companies, universities, and/or individual donors and volunteers also provide substantial support. Some national STEM outreach organizations offer their local networks specialized support and funding for Indigenous-specific outreach.

Examples of this strategy:

ACTUA[37]
Let's Talk Science[38]

Other programs target local Indigenous communities.

IndigeSTEAM[39]

30 National Indian Brotherhood/Assembly of First Nations, *Indian Control of Indian Education.*

31 The 2017 Canada–Métis Nation Accord also calls for discussion about "unique curriculum development to enhance educational outcomes" for Métis learners—see Government of Canada, "Canada–Métis Nation Accord." The Joint Education Action Plan of the First Nation Education Commission (Council of Yukon First Nations) for Yukon First Nation students mandates cultural education standards in all schools for Yukon First Nation students—see First Nation Education Commission, *Cultural Inclusion Standards in All Schools.*

32 Show Me Your Math, "Show Me Your Math."

33 First Nations Education Steering Committee, "Learning First Peoples Classroom Resources."

34 Métis Nation of Ontario, "Making the Grade (Métis Style!)"

35 Innovation, Science and Economic Development Canada, "CanCode Program."

36 Natural Sciences and Engineering Research Council of Canada, "PromoScience Program."

37 ACTUA, "InSTEM: Indigenous Youth in STEM."

38 Let's Talk Science, "Let's Talk Science Fosters Inclusivity With the Development of Indigenous Outreach Training."

39 IndigeSTEAM, "Indigenous Perspectives in STEM and STEAM Opening Doors for All."

Strategies targeting learners in PSE

4. Comprehensive support services for Indigenous college, polytechnic, and university students

Many colleges and universities help Indigenous learners transition into their STEM programs. Comprehensive programs combine academic, personal, financial, and social supports that are culturally appropriate. They may offer courses to upgrade high school math and science to meet admissions requirements. There can be tutoring for university courses, counselling to address personal issues, and advice on financial aid. There are also regular opportunities to be part of an Indigenous community within the larger institution.

Example of this strategy:

ENGAP, University of Manitoba[40]

Defining Indigenization

Camosun College describes Indigenization as "the process by which Indigenous ways of knowing, being, doing and relating are incorporated into educational, organizational, cultural and social structures."

Source: Camosun College.

5. Indigenization of mainstream PSE

Since the Truth and Reconciliation Commission's report in 2015, most PSE institutions have published plans for Indigenization. Sixty-five per cent of Universities Canada members report that they have begun "incorporating Indigenous knowledge, methods and protocols into research and teaching policies, programs and practices."[41] And over 65 College and Institutes Canada members have signed the Indigenous Education Protocol, committing to respect and recognize Indigenous cultures, languages, histories, and contemporary perspectives.[42]

In practice, the majority of PSE institutions are focusing on increasing the inclusion of Indigenous students and academics. Fewer are actively promoting Reconciliation through initiatives such as Indigenous course requirements and bringing Elders or Indigenous Knowledge Keepers on campus. Committing to decolonize and recreate PSE institutions by remaking academic structures and curriculum is even rarer.[43] Authentic Indigenization would mean developing curricula that bring all students to a shared understanding of both Western and Indigenous worldviews. (See "Defining Indigenization.")

Example of this strategy:

Trent University's Indigenous Environmental Studies and Sciences[44]

40 University of Manitoba, "Engineering Access Program (ENGAP)."
41 Universities Canada, "Indigenous Student Education."
42 Colleges and Institutes Canada, "Indigenous Education Protocol."
43 Gaudry and Lorenz, "Indigenization as Inclusion, Reconciliation, and Decolonization."
44 Trent University, "Indigenous Environmental Studies and Science."

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6. Indigenous PSE institutions promoting STEM fields

There are more than 80 Indigenous-owned and -controlled PSE institutes across Canada. Some partner with mainstream colleges and universities to help their students get into diploma and degree programs. Others focus on delivering their own curriculum. A few institutes use a culturally appropriate STEM framework to enhance their programs.

Examples of this strategy:

FNTI Flight Training[45]
Nunavut Arctic College[46]

45 First Nations Technical Institute, “First Peoples’ Aviation Technology–FNTI Flight Training.”
46 Nunavut Arctic College, “President’s Message.”

Strategies targeting STEM graduates

7. Associations for Indigenous professionals in STEM occupations

Indigenous STEM professionals have created associations to support their colleagues in their careers. Most also aim to help young Indigenous students join the profession. In addition to their internal activities, associations may support outreach to schools, employer programs, etc. There are associations of Indigenous professionals in Canada for nurses, doctors, midwives, dieticians, engineers and scientists, mining, information technology, finance officers, psychologists, and foresters.

Examples of this strategy:

Canadian Indigenous Nurses Association[47]
Canadian Indigenous Science and Engineering Society (.caISES)[48]

8. Employer initiatives to prepare Indigenous people for STEM occupations

There are many reasons why Canadian employers want more Indigenous employees to join their workforce. Some employers offer potential Indigenous employees scholarships and summer jobs for students. They may also provide pre-employment training, technology support, and a job upon graduation. To create a more positive work environment, some employers also have inclusion and awareness training to help their non-Indigenous workforce appreciate the historic traumas and cultural differences of Indigenous peoples.

Example of this strategy:

Glencore Raglan Mine RIDE program[49]

47 Canadian Indigenous Nurses Association, “Mission Statement.”
48 Canadian Indigenous Science and Engineering Society (.caISES), “Canadian Region of AISES.”
49 Glencore Mine Raglan, “RIDE Program.”

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Looking deeper

Given the scale of activity in Indigenous STEM initiatives, it is important to understand which strategies are most effective. Very few initiatives have been evaluated, so it is difficult to say which of these approaches is most effective at improving Indigenous representation in STEM.

During this multi-year project, the Conference Board's Indigenous and Northern Communities research team, on behalf of the Future Skills Centre, will:

- examine the inequalities between Indigenous people and mainstream populations in STEM fields, including Indigenous perspectives on defining and measuring success;
- identify the strategies that reflect Indigenous cultures and realities in STEM education and employment that have the potential to reach the most learners;
- explore which strategies are contributing to effective outcomes for learners, particularly from the perspective of employers, Indigenous communities, and governments;
- develop recommendations for STEM educators and funders on best practices to bridge mainstream and Indigenous world views—inside and outside the science classroom.

Our initial research will look at the strategies that reach the largest group of Indigenous learners—Indigenous students in public schools. More than 80 per cent of Indigenous school students—about 375,000 students—attend provincial or territorial public schools.[50] The two strategies that target those students are curriculum reform in public school systems and STEM outreach programs.

Future research will explore the impact of sectoral change and disruptive technologies in northern and remote regions, and the implications for Indigenous skills development in STEM fields.

Do you want to join this discussion?

We would like to hear your perspective. Do you have a favourite STEM initiative? Are there types of STEM initiatives missing from our list of strategies? What do you think are the most effective ways to increase the number of Indigenous people working in STEM fields?

Visit www.conferenceboard.ca/research/how-can-more-indigenous-people-access-stem-careers to join the discussion.

50 Including about 340,000 who live off-reserve, and about 35,000 who live on-reserve but attend off-reserve schools. Canadian School Boards Association—Indigenous Education Committee, *Indigenous Education Structure, Initiatives and Promising Practices,* 4.

Appendix A

STEM occupations by National Occupational Classification (NOC) 2016

0211 Engineering managers
0212 Architecture and science managers
0213 Computer and information systems managers
2111 Physicists and astronomers
2112 Chemists
2113 Geoscientists and oceanographers
2114 Meteorologists and climatologists
2115 Other professional occupations in physical sciences
2121 Biologists and related scientists
2122 Forestry professionals
2123 Agricultural representatives, consultants, and specialists
2131 Civil engineers
2132 Mechanical engineers
2133 Electrical and electronics engineers
2134 Chemical engineers
2141 Industrial and manufacturing engineers
2142 Metallurgical and materials engineers
2143 Mining engineers
2144 Geological engineers
2145 Petroleum engineers
2146 Aerospace engineers
2147 Computer engineers (except software engineers and designers)
2148 Other professional engineers
2151 Architects
2152 Landscape architects
2153 Urban and land use planners
2154 Land surveyors
2161 Mathematicians, statisticians, and actuaries
2171 Information systems analysts and consultants
2172 Database analysts and data administrators
2173 Software engineers and designers
2174 Computer programmers and interactive media developers
2175 Web designers and developers
2211 Chemical technologists and technicians
2212 Geological and mineral technologists and technicians
2221 Biological technologists and technicians
2222 Agricultural and fish products inspectors
2223 Forestry technologists and technicians
2224 Conservation and fishery officers
2225 Landscape and horticulture technicians and specialists
2231 Civil engineering technologists and technicians
2232 Mechanical engineering technologists and technicians
2233 Industrial engineering and manufacturing technologists and technicians
2241 Electrical and electronics engineering technologists and technicians
2242 Electronic service technicians (household and business equipment)
2243 Industrial instrument technicians and mechanics
2244 Aircraft instrument, electrical, and avionics mechanics, technicians, and inspectors
2251 Architectural technologists and technicians
2252 Industrial designers
2253 Drafting technologists and technicians
2254 Land survey technologists and technicians
2255 Technical occupations in geomatics and meteorology
2261 Non-destructive testers and inspection technicians
2262 Engineering inspectors and regulatory officers
2271 Air pilots, flight engineers, and flying instructors
2272 Air traffic controllers and related occupations
2281 Computer network technicians
2282 User support technicians
2283 Information systems testing technicians

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Appendix B

Examples of STEM initiatives targeting Indigenous learners

This is a list of some STEM initiatives that have targeted Indigenous learners in Canada in recent years. This list was compiled through an environmental scan conducted on the Internet in summer 2019. It is by no means comprehensive but gives some idea of the range and approaches of initiatives offered.

Strategies targeting elementary and secondary students

Curriculum reform of STEM in public K to 12

Aircraft Maintenance Orientation, Churchill Community High School

Experiential Science 10-20-30, Northwest Territories, Education, Culture and Employment

Indigenous knowledge and science materials for general classrooms, First Nations, Métis and Inuit Education Association of Ontario and Science Teachers' Association of Ontario

Indigenous Knowledge and Mathematics Community of Practice (CoP), First Nations, Métis and Inuit Education Association of Ontario

Pearson Science: Saskatchewan Edition, Saskatchewan Ministry of Education

Curriculum reform of STEM in Indigenous K to 12

"The Three Sisters" and "The Birch Bark Canoe" multimedia resource (classroom videos and teachers' guide), Engineering Access, University of Manitoba

Digital Mi'kmaq, Ulnooweg

Math Yes We Can, Eagles of Tomorrow

Saskatchewan Cradleboard Initiative, University of Saskatchewan

Secondary Science First Peoples Teacher Resource Guide, First Nations Education Steering Committee

Six Nations Polytechnic STEAM Academy, Six Nations Polytechnic

STEM Professional Development Project for First Nations Educators, Queen's University

The Prime Minister's Awards for Teaching Excellence in STEM, Prime Minister's Office

Unamaki Pathways in Technology, Early College High School (PTECH), Mi'kmaw Economic Benefits Office

Yunk'ut Whe Ts'o Dul'eh (We Learn From Our Land), Chuntoh Education Society

STEM outreach to Indigenous school students

Kid Tech Nation, Boys and Girls Clubs of Canada

Aboriginal Students in Math and Science, Simon Fraser University/Math Catcher Outreach Program

Adventures in Engineering and Science, Ahkwesahsne Mohawk School

Awtiget Summer Camps, Dalousie University, Faculty of Agriculture

Bridging Cultures: Mapping Your Destination with Science, Mathematics & Technology (SMT, University of Lethbridge)

Building Northern Capacity in Environmental Monitoring project, Yukon College

Canada Learning Code, Canada Learning Code

Can-Code program, Manitoba First Nations Education Resource Centre Inc.

Career Alliance 360—Inspiring Girls in STEM/ Indigenous Inclusion, GeoConnections, Natural Resources Canada

Code to Learn, TakingITGlobal

Connected North, TakingITGlobal

Coyote Science, APTN +

Science and Innovators in Schools (SIS), Science World

Digital DASH initiative, Information and Communications Technology Council

Digital Mi'kmaq, Ulnooweg

Eagle Spirit Science Futures Camp, McGill University

Electronic Tutoring & Mentoring (eTM), McGill University

EUReKA! Science Program for the Implementation of Indigenous Only, Girls Only, and At-Risk Youth Programming, Thompson Rivers University

Expanding Our Reach, Aurora College

Expanding STEM Learning Opportunities for Indigenous Youth, University of British Columbia

Exploring Technological Design (TDJ1O), University of Ottawa

First Light Initiative, IndigeSTEAM

First Nations Health and Science-Related Career Promotion Grants, First Nations Education Steering Committee

Global Association for Indigeneering Alliance (GAIA), IndigeSTEAM

Indigenous Initiatives, Let's Talk Science

Indigenous STEAM Camp, University of Winnipeg

Indigenous STEM Outreach off-campus and on-campus events, University of Victoria/ Science Venture

Indigenous Student Ambassadors, Natural Sciences and Engineering Research Council of Canada

Indigenous Summer Science Camps, Elephant Thoughts

Indigenous Youth in STEM (InSTEM), Actua

InSTEM Land Camp, Carleton University

InSTEM Outreach, McMaster University/Venture Engineering and Science Programs

InSTEM Summer Camp, McMaster University

Kendaaswin Day, Canadore College

Koh-Learning in Our Watersheds, University of Northern British Columbia

Making TRACKS: Continuing to engage Indigenous youth through culturally responsive eSTEM education, Trent University

Marine Science Camp, University of Victoria/ Science Venture

Medical Careers Exploration Program, Children of the Earth High School, Winnipeg

Mining Rocks Earth Science Programs, Mining Matters

National Science Camp, Trent University

Nunami Sukuijainiq (Science on the Land), Nunami Sukuijainiq

PLATO Software Tester Training Program, PLATO, Saskatchewan

Power to Choose Aboriginal Youth STEM Camp 2019, IndigeSTEAM

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Programme de l'Expo-Sciences Autochtone (ESA)—Québec, Association québécoise autochtone en science et en ingénierie

Programme Promoscience Design autochtone 3D, Cégep régional de Lanaudière

Project WET Canada, Canadian Water Resources Association

Science Ambassador Program, University of Saskatchewan

Science North, Science North

SHSM ON the LAND! Environmental SHSM, University of Ottawa

Skills Ontario Summer Camp, Skills Canada—Ontario

STEAM Entrepreneurship Program, Shad Canada

Summer Internship for Indigenous Peoples in Genomics Canada (SING Canada), University of Alberta

Te(a)ch, Pinnguaq Association

Tech Trek, Information and Communications Technology Association of Manitoba/HP

TRACKS (Trent Aboriginal Cultural Knowledge and Science), Trent University

Verna J. Kirkness Science and Engineering Education Program, Verna J. Kirkness Education Foundation

Wa Ni Ska Tan, University of Manitoba

WISE Kid-Netic Energy, University of Manitoba

Strategies targeting learners in PSE

Comprehensive support services for Indigenous college, polytechnic, and university students

Aboriginal Access to Engineering, Queen's University

Aboriginal Nursing Cohort Initiative, University of Manitoba

Aboriginal Transitions: Undergraduate to Graduate Studies (AT: U2G), University of British Columbia

Bundled Arrows Initiative, Mohawk College and Six Nations Polytechnic

CREATE H2O, University of Manitoba, Centre for Human Rights Research

Engineering Access Program (ENGAP), University of Manitoba

General Arts and Science—Aboriginal Studies Ontario College Certificate, Algonquin College

Indigenous Health Initiatives, University of Alberta

Indigenous Health Professions (IHP) Program, McGill University

Indigenous Student Access Pathway (ISAP), Dalhousie University, Faculty of Agriculture

Indigenous Student Achievement Pathways—Summer Start, University of Saskatchewan

Indigenous Student Achievement Pathways—STEM Pathways, University of Saskatchewan

Indigenous Student Matriculation Into Medical School, Western University, Schulich School of Medicine and Dentistry

Native Access to Engineering program (NAEP), Concordia University

Northern Ontario School of Medicine (NOSM), Lakehead and Laurentian universities

Pathways to Indigenous Empowerment, Algonquin College

Saskatchewan Indigenous Mentorship Network (SK-IMN), University of Saskatchewan

SRC's Aboriginal Mentorship Program, University of Saskatchewan

Indigenization of PSE institutions

Indigenous Education Protocol, College and Institutes Canada

Joint Commitment to Action on Indigenous Health, Association of Faculties of Medicine of Canada

Principles on Indigenous Education, Universities Canada

Indigenous PSE institutions promoting STEM fields

Foundations and Futures in Innovation and Technology, First Nations Technology Council

ICE-STEM (Inuktitut, Culture, Entrepreneurship—Science, Technology, Engineering and Math) Curriculum Framework, Nunavut Arctic College

Strategies targeting STEM graduates

Associations for Indigenous professionals in STEM occupations

Canadian Indigenous Science and Engineering Society (.caISES)

Aboriginal Nutrition Network, Dietitians of Canada

Canadian Indigenous Nurses Association

Indigenous Physicians Association of Canada

National Aboriginal Council of Midwives

National Aboriginal Forestry Association

Supporting Aboriginal Graduate Enhancement, branches in many universities in Canada

Employer initiatives to prepare Indigenous people for STEM occupations

Cameco's Northern education and training programs, Cameco

Diversity in STEM: Re-entry Program, Natural Resources Canada

First Nations/Metis/Inuit Engineer in Training (EIT) (Thunder Bay/Sudbury), Hatch

Indigenous Student Recruitment Initiative, Agriculture and Agri-Food Canada

Mining Essentials, Mining Industry Human Resources Council

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Appendix C
Methodology

The findings presented in this primer flow from:

- an environmental scan of online sources on more than 100 STEM initiatives in Canada
- an interjurisdictional review of 250 academic and gray literature sources on theory and practice in cross-cultural STEM education
- content analysis of online interviews with 120 Indigenous STEM students and graduates
- interviews with 20 Canadian professionals who are involved with STEM initiatives for Indigenous learners.

Appendix D
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