NATIONAL POSITION STATEMENT

Transforming Indigenous People's Access to Post-Secondary Engineering Education

The engineering profession's position

- Transforming the representation of Indigenous Peoples, world views, and ways of knowing in post-secondary engineering education is crucial for developing solutions through a holistic lens, while fostering innovation, addressing skills shortages, and amplifying diverse perspectives in tackling complex challenges.
- Federal government support for Indigenous access to engineering programs is essential to maintaining Canada's leadership in providing intellectual capital to the global marketplace. In addition, federal government support is required to address the Calls to Action 6 to 12 of the Truth and Reconciliation Commission (TRC).
- Initiatives promoting Indigenous representation should be incorporated throughout the engineering journey, beginning in kindergarten to Grade 12 (K-12) with grade-school programs and curricula embedding Indigenous systems of knowledge throughout subject contents.
- Post-secondary institutions and programs dedicated to honouring Indigenous representation, world views, and knowledge systems play a critical role in attracting and retaining Indigenous people in the engineering profession.
- Engineers Canada collaborates with provincial and territorial regulators to ensure the profession reflects Canadian demographics and meets the needs of the Canadian economy. This work aligns with the TRC's Call to Action 92.

The challenge(s)

Indigenous people in Canada, despite making up over 4.9 per cent of the population, are significantly underrepresented in engineering programs, accounting for only 0.6 per cent of undergraduate enrolment and 0.73 per cent of the profession.[1,2] This disparity is not due to a lack of interest or capability, but rather the result of systemic barriers.

These barriers are multifaceted, encompassing social, political, and economic challenges that have been perpetuated by ongoing colonization and intergenerational trauma from the residential school system. The residential school system was established to assimilate Indigenous children into Euro-Canadian culture. Inadequate funding for schools and early education gaps further exacerbate this issue. Discriminatory attitudes within the engineering profession and limited awareness of engineering as a career option for Indigenous people also contribute to low enrollment in engineering education programs and graduates with engineering licences.

[1] Statistics Canada (2018). Aboriginal Population Profile. 2016 Census. Statistics Canada Catalogue no. 98-510X2016001. Ottawa. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/abpopprof/index.cfm?Lang=E

[2] Engineers Canada (2021). Indigenous Engineering in Canada. https://engineerscanada.ca/indigenous-engineering-in-canada.

The importance of Indigenous representation in the engineering profession cannot be overstated. It is crucial for protecting the public interest and reflecting Canada's diverse demographics. However, systemic barriers disproportionately affect marginalized and underrepresented groups, including Indigenous people.

To truly advance engineering and applied sciences, it is vital to value and embed Indigenous perspectives and traditional ways of knowing into the education system. This objective aligns with the decolonization of education and the Calls to Action set forth by the TRC. [3]

Engineering faculties aim to prepare students to be innovators and entrepreneurs. However, the representation of Indigenous people in accredited engineering programs is significantly lower than their population percentage in Canada. Embracing traditional ways of knowing within post-secondary engineering education and ensuring Indigenous representation can foster growth and innovation in the profession.

The impacts of systems of oppression on Indigenous people's access to post-secondary engineering education in Canada are far-reaching. These impacts include unemployment, poverty, geographical challenges for remote communities, inadequate high school education support, limited availability of prerequisite science and math courses in remote areas, limited availability of STEM role models, and insufficient information on career options.

Addressing these challenges requires understanding both the present circumstances and historical context. The long-standing history of colonialism and assimilation in Canada has erected numerous obstacles for Indigenous people.[4,5]

Numerous studies have explored a multitude of factors that contribute to Indigenous post-secondary student success in university undergraduate programs.[6,7] Students have identified several university services that positively impact their university experience, including Indigenous counsellors, dedicated scholarships and bursaries, and spaces specifically allocated for Indigenous students. However, they also encounter challenges such as transition issues, financial constraints, and lack of community. By addressing these challenges and implementing decolonization strategies, we can make post-secondary engineering education more just and accessible for Indigenous people. This will not only contribute to the advancement of the engineering profession but also benefit Canadian society.

How Engineers Canada has contributed

Addressing the underrepresentation of Indigenous engineers necessitates acknowledging the historical and ongoing oppression of Indigenous Peoples within the engineering field. This includes recognizing the impacts of projects on Indigenous lands, the establishment of man camps, and the marginalization of Indigenous worldviews within engineering education.

Increasing Indigenous representation in post-secondary engineering education and the profession extends beyond innovation. It aligns with the United Nations Declaration on the Rights of Indigenous People (UNDRIP) and

[3] The Truth and Reconciliation Commission of Canada. (2015a). Calls to Action. Winnipeg, MB.

[4] Hallett, D., Want, S. C., Chandler, M. J., Koopman, L. L., Flores, J. P., & Gehrke, E. C. (2008). Identity in flux: Ethnic self-identification, and school attrition in Canadian Aboriginal youth. Journal of Applied Developmental Psychology, 29(1), 62-75. https://doi.org/10.1016/j.appdev.2007.10.008

[5] Lamb, D. (2014). Aboriginal early school leavers on- and off-reserve: An empirical analysis. Canadian Public Policy, 40(2), 156-165. https://doi.org/10.3138/cpp.2012-060

[6] Timmons, V. (2013). Aboriginal students' perceptions of post-secondary success initiatives. The Canadian Journal of Native Studies, 33(1), 231-237.

[7] Tanya Chichekian, Catherine Maheux. Indigenous students' experiences regarding the utility of university resources during medical training, International Journal of Educational Research Open, Volume 3, 2022, 100212, ISSN 2666-3740. https://doi.org/10.1016/j.ijedro.2022.100212.

encourages Indigenous youth to consider engineering as a career path by fostering the development of Indigenous engineering role models. To reflect Canada's demographics in the engineering profession, it's vital to ensure that Indigenous students have safe, equitable, and decolonized access to post-secondary engineering education.

Engineers Canada is committed to promoting initiatives that attract and retain Indigenous people in post-secondary engineering education and the profession. These contributions include:

- Undertaking projects like the *Report on Truth and Reconciliation in Engineering Education*. This initiative engages Indigenous students, faculty, and staff from engineering faculties across the country, capturing Indigenous experiences and perspectives within engineering education through interviews and surveys. The aim is to foster inclusive and equitable engineering faculties. *Indigenous Inclusion in Engineering* research provides valuable insights into the life experiences and characteristics of Indigenous engineers across three provinces.

- Playing a key role in establishing the Canadian Indigenous Advisory Council (CIAC) within the American Indian Science and Engineering Society (AISES). Engineers Canada supports AISES in Canada by providing mentorship and networking opportunities.

- Highlight successful programs like the University of Manitoba's Engineering Access Program (ENGAP) and Queen's University's Aboriginal Access to Engineering program, which help bridge educational gaps and provide essential resources.

- Working with provincial and territorial engineering regulators to ensure fair application of standards, thereby promoting equal opportunities for all aspiring engineers, including Indigenous people.

- Issuing a *Guideline on Indigenous Consultation and Engagement*, which was developed in response to key works such as the Royal Commission on Aboriginal People (RCAP), the Truth and Reconciliation Commission's (TRC) Calls to Action, the Missing and Murdered Indigenous Women and Girls (MMIWG) Calls for Justice, and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). This guideline embodies Engineers Canada's commitment to fostering relationships, contributing to improved community outcomes, and promoting collective healing. It encourages users to engage with humility and empathy, extending relationship building beyond just engineering projects.

- Fostering connections and knowledge sharing among educators and staff members at various academic institutions who are working towards decolonizing and indigenizing the engineering education system.

Through active support of these programs and initiatives, Engineers Canada strives to foster a more equitable and diverse engineering profession, enhancing access to education for Indigenous people and increasing their representation in the field.

Recommendations to the federal government

The federal government's support is crucial in aiding the engineering profession's efforts to attract Indigenous people to post-secondary engineering education. This involves endorsing programs that cultivate inclusive environments where all students feel welcomed and appreciated.

Supporting the advancement of Indigenous people participating in engineering aligns with the Truth and Reconciliation Commission's Calls to Action, which aim to eliminate educational and employment gaps between

Indigenous and non-Indigenous people. To increase Indigenous participation in engineering, several measures need to be taken:

- Expand access programs: Allocate funding to expand existing Indigenous people's access programs and establish new ones. Support the use of digital technologies to provide educational opportunities for remote Indigenous communities.
- Fund Barrier Research: Invest in research on the barriers that hinder the entry and inclusion of Indigenous youth in engineering programs.
- Support workforce transition: Support well-paid post-secondary engineering co-op programs for Indigenous students and implement subsidized employment programs to facilitate the transition of Indigenous engineering graduates into the workforce.

To encourage more equitable workplaces and improve relations between the engineering profession and Indigenous communities, the federal government should:

1. Support meaningful consultations with Indigenous people to develop pilot programs for new professional conduct training that address the unbalanced relationships between Indigenous people and the engineering profession.
2. Allocate funding for the development of resources to help engineers navigate and address the Truth and Reconciliation Commission's 94 Calls to Action.

Lastly, it's crucial for the federal government to support efforts to attract and retain Indigenous people in the engineering profession in Canada. This includes funding the establishment of an Indigenous professional engineering association that can facilitate outreach, access, bursaries, mentorships, and work-integrated learning opportunities for Indigenous engineers across the country.

How Engineers Canada will contribute

Engineers Canada remains fully committed to Truth and Reconciliation and supporting the engineering profession in its efforts to attract and retain Indigenous people in both post-secondary engineering education and the profession itself. To achieve this, Engineers Canada will undertake the following initiatives:

- Actively promote and provide support to programs that facilitate Indigenous participation in undergraduate engineering programs. Engineers Canada will also collaborate closely with the federal government and partners to ensure the necessary measures and supports are in place.
- Maintain active membership in the Canadian Indigenous Advisory Council (CIAC), actively contributing advice and guidance to the programming efforts of the AISES.
- Support student participation in the annual AISES in Canada conference.
- Highlight the achievements of Indigenous engineers and students in Engineers Canada's publications.

- Collaborate closely with engineering regulators to gather essential data on the number of Indigenous professional engineers practicing in Canada. This includes establishing partnerships with relevant groups and Indigenous associations to foster collaboration and promote inclusivity.

Guided by truth and reconciliation, Engineers Canada aims to make substantial progress in increasing Indigenous representation in the field of engineering and fostering a more just and supportive environment for Indigenous people within the profession.