

Hypothesis or Research Question(s): The aim is to explore the backgrounds of youth participating in Geering Up's STEM Outreach summer camps and their family backgrounds. We expect that the youth's engagement in the camps and their STEM identity/self-efficacy are influenced by factors pertaining to their family background: socio-economic status, racial-ethnic identities, families' educational/professional backgrounds, and gender.

PROJECT BACKGROUND & SUMMARY

To the detriment of Canada's current and future global competitiveness, the populations of engineering students in Canada do not reflect the larger national or provincial populations in gender, racialized groups, and the participation of Indigenous peoples. Outreach activities to tackle these persistent and complex dynamics of privilege and marginalization, such as Science, Technology, Engineering and Math (STEM) summer camps inclusive of under-represented groups, have been developed in all Canadian provinces and territories and continue to grow rapidly. Canadian outreach programs have been shown to increase STEM identity and self-efficacy in children and adolescents. Yet, no preexisting research documents which groups of young people are reached by these programs. In other words, it remains unknown whether children and youth accessing early STEM outreach reflect the wider local or provincial population. It may be that STEM camps re-entrench pre-existing inequalities in young people's STEM access, and therefore further widen gaps between groups of children and youth, in terms of likelihood of developing a STEM identity and potential STEM or engineering career path. (Outreach programs often tackle STEM overall - our interest is impact on both STEM and engineering careers, but because engineering tends to have less diversity, we have a special focus on engineering-related outcomes). We intend to explore this research with a multidisciplinary team of faculty from several Engineering disciplines (Biomedical, Mechanical, Electrical and Computer) and Arts (Sociology).

The student (TS) will be part of an ongoing research project looking to explore the effectiveness of STEM outreach projects in reaching children and youth from underrepresented and historically marginalized groups.

For the summer of 2024, TS will help to conduct surveys of both participants and parents/guardians of the outreach initiative taking place between July and August. This work will extend and build upon the findings of a previously conducted pilot study. TS will help to prepare and distribute surveys measuring youths' perceptions of STEM identity and self-efficacy across Metro Vancouver. TS will also prepare and distribute surveys for parents of youth to capture the effect of factors that might influence student participation in STEM to see if these STEM programs are targeting the demographic of underrepresented young people they aim to. These factors include household socioeconomic status, parental involvement in STEM careers, student's home numeracy environment, parents' perceptions of STEM education and careers, etc. We will link the survey results from the youth participants and their parents/guardians to better understand the influence of home background on youth's STEM identity and interests.

BENEFIT TO THE STUDENTS

TS will be involved in following aspects of the project, which will enable them to develop a diverse skill set:

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- Literature review of the key factors in STEM outreach effectiveness and possible metrics, instruments, and study designs to evaluate outreach programs.
- Working with the outreach organization to organize and facilitate the processes of collecting parental consent and distributing surveys to camp participants across locations in metro Vancouver.
- Analyzing survey results, performing data visualization, data preprocessing, and basic statistical analyses.
- Planning long-term follow-up and contributing to the design of a future study to explore the impact of outreach to a broader population. This includes understanding data collection/management and ethics review requirements, and developing ideas/tools for setting this up.

We have a great team of UBC faculty/students involved (4 APSC faculty, 1 faculty from Sociology, a MASc student, and other undergraduate students). We also have close partnerships with Geering UP (the Senior Manager Geering Up & Outreach and the Assistant Manager of Camps at Geering Up).

The student will have access to all of these above-listed individuals and their expertise where needed - a highly valuable mentorship experience. The student will be provided an inclusive workspace with a vibrant and diverse team, where they can work with other students on this broader STEM outreach project. The student will also receive the proper training to do their tasks. The student will be provided an opportunity to familiarize themselves with the UBC ethics application protocol (RISe), completion of the TCPS 2 CORE training for research ethics applications, as well as orientation and safety training for the workspace. The student will be given the opportunity to help communicate the results of this work with the broader community, including opportunities to present at a conference and/or publish this work. From this project, the student will gain valuable exposure to project and time management, teamwork, and effective communication. They will also gain opportunities to strengthen their knowledge of Equity, Diversity, and Inclusion (EDI) principles, engineering accreditation process and competencies, professional ethics, and the challenges and barriers for under-represented youths. Student #1 will be primarily in charge of administering and analyzing the surveys of the youth campers. Student #2 will be primarily in charge of administering and analyzing the surveys of the campers' parental figures. Each student will familiarize themselves with the relevant background literature and conceptual frameworks, perform data visualization, and basic statistical analysis of their respective projects. At the end of the project, student #1 and #2 will also work together to further analyze the influence of family factors on the camper's camp engagement, STEM identities and self-efficacy. Both students will meet weekly or bi-weekly (depending on the phase of the project) with the supervising faculty to discuss progress, gain feedback, and help decide on tasks and timelines.