

The gender divide in science-technology-engineering-mathematics (STEM) fields continues to be a point of conversation and research. Within our secondary classrooms we still find a distinct enrollment divide in the number of girls who study physics as compared to boys, with the number of boys who study biology generally less than girls (chemistry is often about equal). This is not exclusively a Canadian phenomenon. A study conducted looking into the intentions of 15-year-olds found girls all over the world express more interest in studying biology, agriculture, and health sciences, while boys are generally more interested in studying areas connected to computers, engineering, and mathematics (Sikora & Pokropek, 2012).

In Canada, of the 24% of students that graduate in STEM from universities, 39% are women (Hango, 2015). Encouragingly, more degrees in science and technology are now earned by women (59%), however in areas of mathematics and computers, and engineering, women make up a much smaller proportion of the graduates at 30% and 23%, respectively (ibid). Recurrent reported findings are that women: undervalue their STEM abilities (boys with lower scores on assessments like PISA are more likely to enroll in STEM programs than girls with higher scores, Hango, 2015; male peers are more likely to undervalue girls abilities in biology, University of Washington, 2016); find a lack of personal meaning and relevance (STEM may be taught with a lack of contextual relevance and significance, Egbue, Long, Ng, 2015; Gilley & Begolly, 2005; Nugent et al., 2015); have lower career outcome expectancies (in Canada there is a higher percentage of women qualified with STEM degrees who are unemployed, and women are, on average, paid less in STEM related careers than their male counterparts, Hango, 2015).

As educators we play an important role in shifting these attitudes. A study by Nugent et al. (2015) reveals that a student's career orientation is influenced by interest and career outcome expectancy, more than self-efficacy and knowledge. And that interest is influenced by peers, family, and educators. As educators, we have an opportunity within our classrooms to make decisions to include experiences that students may not have had previously to cultivate interest, as well as provide opportunities to demonstrate relevance and possible careers connected to engineering and mathematics that may have otherwise not been considered.

Three strategies found to support girls' positive interest development in STEM fields include: conducting research (Villarejo, Barlow, Kogan, Veazey, & Sweeney, 2008), accessing external groups (Kurz, Yoder, & Zu, 2015), and engaging in Authentic fieldwork or Informal Natural Science learning settings (Hiller, & Kitsantas, 2014). While it may sound daunting to incorporate all of these in the classroom, students who engage in authentic experiences are found to connect to STEM in ways they hadn't before.

...students in Project Exploration demonstrated increased science capacity; positive youth development; and meaningful engagement in a community of practice that nurtured relationships while helping them learn from one another, envision careers in science, and conceptualize their futures (Lyon, Jafri, & St. Louis, 2012, p. 50).

There are many organizations that support the implementation of such experiences into the classroom. Below are some contacts that you may consider for your students:

Conducting Research:

- [Smarter Science](#) - provide opportunities for student-drive inquiry for students to see themselves working as scientists in real research.
- [Curiosity](#) - Action research projects such as the Fish Market Survey, Energy for Change projects engage students to collect real data and share with students across Canada.
- Science fair - Provide opportunities for students to show off their research at school, regional or Canada-wide Science fairs
- Additional opportunities (though time sensitive): [Research Opportunity Program in Engineering](#); Sick Kids' [Student Advancement Research](#)

External Groups:

- [Virtual Researcher on Cal - connect your class to STEM researchers through video conferencing. Find role models for students to 'see themselves' reflected in STEM fields and build interest in new, innovative STEM research.](#)
- Go ENG Girl - University outreach to inform girls, grades 7 - 10, about engineering
- [Engineer in Residence](#) - Request an engineer to connect with your class throughout the school year and support student investigations, while sharing inside information on Engineering careers.
- [We Made It](#) - Features female role-models in Engineering and classroom resources for integrating Engineering Design in your class.

Authentic Fieldwork:

- [Citizen Scientists; School Malise Trap Program](#) (spring and fall to bring biodiversity into the classroom).

There is also a growing online community (#GirlsInSTEM or #WomenInSTEM, for example) engaging in the broader discussion surrounding STEM.

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