FINAL REPORT

NSERC CHAIR FOR WOMEN IN SCIENCE AND ENGINEERING
BC AND YUKON REGION | 2010-2015

September 26, 2015

Chairholder Information:
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EXECUTIVE SUMMARY

WWEST has created change.

Operating as Westcoast Women in Engineering, Science & Technology (WWEST), the 2010-2015 NSERC Chair for Women in Science and Engineering for the BC and Yukon Region, held by Dr. Elizabeth Croft at the University of British Columbia, changed the way people talk, act on, and measure gender diversity in science, technology, engineering and mathematics (STEM).

By changing the way we talk about STEM, we open the doors and invite women to pursue this change. Our story is one of a creative, engaging, and rewarding profession where people solve problems, design solutions, help local and global communities, and love what they do. With this story, UBC Engineering went from an annual intake of 19% women to 30% women.

By changing the way we talk about diversity in STEM, we motivate people to create change. We designed easy-to-read business cases for change, and backed them with facts and citations. Companies asked for copies, and referenced them. Non-profits entered co-branding distribution agreements. We changed the discourse from a women in STEM issue to a people in STEM issue.

WWEST transformed the way organizations act on encouraging diversity in STEM. We provided expertise, a hub, and a conduit for activity. Our WWEST Partners program engaged twenty non-profit and university-based organizations, leading to more collaborations, new and expanded programming, and a sustainable plan to support women in STEM at all levels. More than a funding program, WWEST Partners provided training workshops and a community of practice members could access.

We changed how women in STEM connected to, and stayed connected to, the network. In addition to newsletter, social media, and web communication on events, resources, and activities, the Creating Connections bi-annual conference became a permanent fixture in the BC/Yukon region, bringing 300 community members together to network, learn, engage, and activate change.

WWEST created lasting change in the UBC Engineering curriculum, changing when and how we talk about ethics, professionalism, and respect. We supported student leaders in evaluating events for inclusion, and in creating a new tradition and ceremony – the Iron Pin, a symbol for the adoption of their student-created Code of Ethics in their first few months of study in engineering.

By providing workshops, support, and a roadmap, WWEST changed how women in industry and academia act to advance their careers. Mentors, peer networks, and self-reflection tools led to a step-change in women Associate Professor’s occupational self-efficacy, a proxy measure for persistence in their case for promotion to Professor.

WWEST set a new standard for rigorous assessment of measurable changes in attitudes and behaviours that result from our events and activities. We identified occupational self-efficacy as a strong proxy for persistence in ones’ career, and selected a measure from the literature. This measure is now used for events across Canada. WWEST also created a novel measure for Awareness of the Benefits of Gender Diversity, a key construct in finding allies for change.

WWEST has created change – a transformation that is substantial, impactful and, with many colleagues carrying it forward, a permanent change on the STEM landscape.
Impact Map
September 2010 - August 2015

Other Communities Impacted:
- Guelph
- Halifax
- Montreal
- Ottawa
- Quebec City
- Regina
- Toronto
- Washington, D.C.

Metro Vancouver Impacts

* Note that Calgary, Alberta is the nearest and most easily accessed population centre for eastern BC.

Population Density by Census Division (persons/square kilometre)
- Less than 0.1
- 0.1 - 0.9
- 1.0 - 3.5
- 3.6 - 19.9
- 20.0 - 49.9
- 50.0 - 150.0
- Greater than 150.0

Adapted from Statistics Canada, Population Dwelling Count Highlight Tables, 2006 Census, Catalogue number 97-550-XWE2006002

* Note that Calgary, Alberta is the nearest and most easily accessed population centre for eastern BC.

Communities Impacted
September 2010 - August 2015
- Direct intervention
- WWEST Partners
- Community Representation

Base map from Brock University Map, Data & GIS Library
Original Objective:

**AWARENESS AND OUTREACH: ESTABLISH AND BUILD A SUSTAINABLE WISE NETWORK**

**FEATURED SUCCESS: WWEST PARTNERS**

Established in early 2011, the WWEST Partners program built a community of practice and provided financial and expertise resources that help community members to learn, share, and disseminate best practices and build towards the long-term sustainability of their respective programs. WWEST Partners brings together new and existing not-for-profit organizations from throughout British Columbia and the Yukon that have a focus on promoting women in STEM.

The WWEST Partners program was designed to ensure sustainable funding model. The funding structure was based on the needs of each group, but most partners signed multi-year funding agreements, providing a reliable base of support on which to grow, with amounts that diminished over time, compelling partners to pursue other sources of funding before the WWEST Partners agreement was complete. Projects could apply for up to three years of seed, plus up to one year of additional funding for impact measurement and grant extensions.

As part of participation in this program, WWEST Partners are expected to collaborate and share best practices, participate in face-to-face networking opportunities for non-profit leaders, and attend targeted training workshops, including event management and measuring efficacy. WWEST Partners programs encompass all levels of outreach, and all areas of the region, providing broader, sustained, and community-based impact.

In addition to the outstanding impacts individual partners have produced (see Appendix 12), we have seen region-wide benefits. Twenty Partners who were previously separated by geographic constraints are now sharing resources and mentoring each other in program development, allowing new programs to flourish much more quickly. Groups that previously had relatively small regular audiences are working together to co-present events, broadening their impact. For example, two WWEST Partners that typically reached less than twenty participants each partnered with a group which had not previously offered women in STEM programming, selling out an evening talk with one hundred participants.

“Support from the WWEST Partners program allowed All-Girls Science programming in the Yukon to flourish. It was important for our program to have connection to the wider community. Thank you!”

- Heather Dundas, Coordinator, Science Adventures, Yukon College

**LOOKING AHEAD**

The 2015-2020 Chair will continue the WWEST Partners program, with plans to add an industry engagement component.

**LEARN MORE**

Please see the Impact Map, Appendix 11, and Appendix 12.

Recommendations and Best Practices

The BC and Yukon Region has a huge number of non-profit and institution-based groups that already had expertise, name recognition, contacts, and people passionate to help. It is more effective to support and grow their success than to start competing programs.

Multi-year funding agreements help organizations plan for long-term success and provide the stability needed to encourage other funders to invest in the project.

Organizations that are not affiliated with a university or are located outside of a major urban centre have additional barriers to success. Providing travel funding allows them to fully participate in WWEST Partners training and networking events, and ensures they feel supported.

Some communities, particularly outside of urban centres, have unique needs that require more support than a brief visit could provide. WWEST Partners allows the Chair objectives to be met utilizing local people and local resources. Investing in Partners invests in communities, organizations, and people, and ensures programs are sustainable year-round and beyond the end of the Chair.

During each application round, WWEST Partners submitted abstracts for potential projects. They discussed the abstracts with WWEST representatives at the fall training sessions, receiving feedback before submitting their final proposals. This helped less-experienced Partners improve their applications before they are sent to the review committee. It also helped WWEST to identify areas of overlap early, allowing us to suggest collaboration or coordination.
Recommendations and Best Practices

When creating a recurring event, create a strong brand that stays consistent each time you offer it. This allows you to maintain a strong core of attendees.

Where possible, offer events that occur annually or bi-annually at a consistent time of year so people remember to look for the event.

Show change through pre- and post-measurement. Use validated measures to ensure your results are reliable, consistent, and can be attributed to the effect you are trying to quantify.

Community-based workshops are most effective when a community host is involved. Having one or more host organizations select locations, timing, topics, registration procedures, and other key logistics helps ensure you are delivering content appropriate to the community.

Original Objective:

AWARENESS AND OUTREACH: PROVIDE SUPPORTIVE NETWORKING OPPORTUNITIES

FEATURED SUCCESS: CREATING CONNECTIONS

Creating Connections (CC) is a bi-annual regional conference that brings people together from across the region to network, learn and advance strategy to improve gender diversity in STEM. Croft and Pelletier were involved in the founding conferences in 2007 and 2009; WWEST organized the 2011 and 2013 conferences, and supported the 2015 conference at SFU, launching the next NSERC BC/Yukon Chair.

CC 2013 brought together 300 people from across BC and the Yukon, through WWEST Partner outreach and supported by travel subsidies. The objectives for the conference were to increase awareness of the benefits of gender diversity in STEM, and to encourage women in STEM to persist in their career paths.

As shown on the boxplots to the left, two validated psychometric instruments were used to assess the change in participants’ awareness of the benefits of gender diversity and their change in occupational self-efficacy (a proxy outcome to predict career persistence).

Participants in CC 2013 showed an immediate, statistically significant positive increase in their awareness of the benefits of gender diversity ($p<0.001$), an immediate, statistically significant positive increase in their occupational self-efficacy ($p<0.001$). The awareness effects were sustained at a six month interval ($p<0.05$). These results have been submitted to publication in the journal Career Development International.

FEATURED SUCCESS: WORKSHOPS

Although travel subsidies assisted women from outside Metro Vancouver to attend CC conferences, we also travelled to communities to deliver over 100 workshops. Content included leadership development, effective measurement, mentorship, salary negotiation and the benefits of gender diversity in the workplace. These workshops were offered in centres across the region, including Whitehorse, Kelowna and Victoria.

LOOKING AHEAD

Creating Connections has become a key, anticipated event in the region. The 2017 conference will be held at Simon Fraser University.

The content of all workshops developed by WWEST has been shared with the 2015-2020 Chair and the NSERC CWSE Réseau National Network, with permission for reuse and adaptation.

LEARN MORE

Please see Appendix 4, Appendix 9, Appendix 12, and Appendix 13.
A strong, consistent visual identity is important for building an audience. Maintaining branding over time and future Chairs will allow WWEST to retain its audience and increase its impact.

Curating content in social media is important. Pushing too much content can reduce your ranking in display algorithms (such as the Facebook feed).

Many of the CWSE programs use social media. Liking, promoting, or sharing the content of the other programs enhances all of the programs content, and increases our audiences.

A key contributor to media coverage is being available to the media. Working with the University’s Public Affairs unit ensured that they knew what Dr. Croft could speak to, and how to get in touch with her quickly. Interviews often need to be set up for the same day.

Work with other groups to coordinate nominations for awards. The strongest candidates are supported by many groups.

Having overlap between the 2010-2015 and 2015-2020 Chair allows for a strong transition, cross-training, and support.

Original Objective:

**FEATURED SUCCESS: NEWSLETTER & SOCIAL MEDIA**

When WWEST was established, the BC/Yukon region had a large number of women in STEM organizations and a strong body of leaders with varying levels of cross connection. It was immediately clear that one pressing need was for organization, coordination, and cross-marketing. A social media strategy was developed that was centered around highlighting the activities already taking place in the region, in addition to WWEST’s own activities. Highlights from WWEST Partners and articles of interest were later added. Information is now pushed through 251 Facebook Likes (followers), 329 Twitter followers, a blog with RSS, 326 subscribers to our semi-monthly digest, and over 1000 impressions per month on our Pinterest account.

“As a consultant to the WinSETT Centre (Canadian Centre for Women in Science, Engineering, Trades and Technology), I have found the newsletters from WWEST to be very informative. It has been good to read of activities in BC, of the work of NSERC Chairs for Women in Science and Engineering, and especially to be pointed to articles and research on the attraction, participation, retention and leadership of women in SETT fields. Thank you for your excellent product.” -Carolyn J. Emerson

**FEATURED SUCCESS: BEING MEDIA-FRIENDLY**

Dr. Elizabeth Croft is an expert in a variety of topics—from robotics research to encouraging girls to STEM to equity in STEM fields— and she frequently comments in the news, generously sharing her time and knowledge. WWEST, Dr. Croft, and WWEST Faculty Associate Dr. Sheryl Staub-French were featured in 83 media articles and videos, in publications such as The New York Times, The Economist, and The Globe and Mail.

During her time as Chairholder, Dr. Croft has won three awards, including WXN Top 100 Most Powerful Women in Canada, and was featured at UBC Board of Governors meeting. WWEST Manager Jennifer Pelletier has won three awards, and Dr. Sheryl Staub-French, the newly established Goldcorp Professor for Women in Engineering, has won one. WWEST has submitted 11 successful award nominations for women in STEM, from student leaders to senior industry workers. Additional nominations are under consideration.

**LOOKING AHEAD**

The WWEST newsletter and social media feeds will be taken over by the 2015-2020 Chair. WWEST 2010-2015 staff person Robyn Choi has been hired by the WWEST 2015-2020 team to ensure a smooth transition.

**LEARN MORE**

Please see Appendix 7 and Appendix 8.
Recommendations and Best Practices

Engineering Explorations was an outreach event, not a recruitment event – our goal was to encourage girls to consider a career in engineering in a pressure-free environment.

Working with a school district is an excellent way to include students who may not have attended a university-based event. Finding a teacher co-host is essential in making this work.

When teachers bring curriculum materials back to their classrooms, you are reaching 25 or more kids for every teacher – many more if they share the kits at their schools. Providing supplies not only ensures the teachers can do the activities, it also helps communicate your respect for and understanding of their work and expertise.

Original Objective:

RECRUITMENT: DEVELOP A COMPREHENSIVE STRATEGY FOR ENGINEERING RECRUITMENT

FEATURED SUCCESS: ENGINEERING EXPLORATIONS

Engineering Explorations is a series of day-long outreach events for women high school students, allowing them to explore and consider engineering as a viable and rewarding career through hands-on design challenges, student- and alumni-led activities, lab tours and demonstrations, and mentorship from current women engineering students and industry professionals. These events are aimed to support the recruitment and retention of women in STEM, organized by WWEST in partnership with UBC Engineering and eng-cite:

Engineering Explorations 10 (formerly Engineering Power Up!) 2013-2015, 210 participants

The 2015 event introduced a psychometric analysis of the students’ self-efficacy pre- and post-event, with a +1.99 increase on a scale out of 40 (p <<0.001, see boxplot on the left).

“It was a very interesting experience for me as I got to see cool labs. I also got to meet people that work/study in the fields that I am interested in. This event gave me an idea of what my dream career looks like and what I need to do to pursue it.” - Grade 10 Participant

Engineering Explorations 9: Go ENG Girl 2014, 90 participants

This event originated in Ontario, and was brought to UBC Vancouver with the support of the Ontario Network of Women in Engineering (ONWiE) for the first time in fall 2014.

Engineering Explorations 8: Introduce a Girl to Engineering Day 2013-2015

Steveston-London Secondary School, Richmond, 190 total participants

Run in conjunction with School District 38, consisting of a keynote speech and three hands-on, engineering student- and alumni-led activities that exposed a broad range of engineering jobs.

FEATURED SUCCESS: TEACHER’S CONFERENCE

Held in 2010 and 2014 at UBC Vancouver, with a total of 196 teachers, Engineering in Your Classroom led grade 6/7 teachers through three engineering-related activities that were easy to implement, affordable, and fit within the new BC Curriculum. The workshop also discussed how they can be used to encourage and foster critical inquiry and thoughtful reflection by students about the role of STEM in society. A short keynote address emphasizes the role of a teacher in a student’s decision to pursue a future in STEM and how an understanding of how STEM serves our society can be particularly encouraging to women who are considering a STEM career. Each teacher who attended received a classroom kit of all the materials needed to run the activities.

“It was the best pro-D I’ve been to. Fun, interesting, resources, food, interaction with professors and students. Awesome!” - Teacher Participant (anonymous feedback)

LOOKING AHEAD

Recognizing the strong impact that Dr. Croft’s efforts through WWEST has made on gender diversity in STEM in BC/Yukon, particularly around supporting women in engineering, Goldcorp has donated $500,000 to UBC Applied Science to ensure outreach efforts to bring more young women into engineering continue beyond the Chair. Plans are underway for Engineering Explorations 2015/2016 at UBC Vancouver and other locations in BC.

LEARN MORE

Visit the Goldcorp Professorship’s website, www.engcite.ca
Original Objective:

**RECRUITMENT: EVO LVE CURRIC ULUM AND UTLIZE COMMUNITY SERVICE LEARNING**

**FEATURED SUCCE SSS: G LO BAL EN GINEERING LEADERSHIP**

Dr. Croft served on the Faculty of Applied Science Community Service Learning (CSL) working committee since its inception in 2009 until 2012 and continues to support CSL activities as Associate Dean, Education and Professional Development. CSL is now a core component the second year Mechanical Engineering Program, in third- and fourth-year mechanical engineering courses, and courses in Chemical and Biological Engineering and Civil Engineering. Dr. Croft also developed a set of two CSL Global Engineering Leadership courses that are taken as electives by senior students. Since the start of the Chair, more than triple the number of engineering students participate in CSL. We have also seen a marked increase of women students entering Mechanical Engineering – with traditionally very low enrollment of women, up to 29% from a pre-chair average of about 13%.

**FEATURED SUCCE SSS: IRON PIN AND FIRST YEAR CURRIC ULUM RENEWAL**

The UBC Engineering Inclusion Initiative was launched in the spring of 2014, capitalizing on the culture changes started by WWEST and catalyzed by Dr. Croft and student leaders who have worked with WWEST. This project is making recommendations for and concrete changes to curriculum, faculty awareness, and student life to ensure an inclusive and supportive environment for all students.

In addition to working with the Engineering Inclusion Initiative, the Engineering Undergraduate Society (EUS) at UBC Vancouver approached WWEST for assistance in evaluating their historical events and activities for diversity, inclusion, and other measures. Supported by the Faculty and in conjunction with Jennifer Pelletier, the EUS created the Iron Pin ceremony to address a concern about the lack of early education on Engineering Ethics. Adapting the APEGBC Code of Ethics, the Iron Pin ceremony involves engineering students, staff and faculty accepting the UBC Engineering Code of Ethics. In 2014 over 2300 students, faculty and staff took part in the ceremonies. At least two other universities has scheduled an iron pin ceremony for fall 2015, and other universities are currently considering adaptations.

Championed by Dr. Croft and supported by the success of community-based experiential learning pilots in upper year classes, UBC Vancouver is also re-evaluating the first year curriculum to focus on the integration of design, problem-solving, and social contexts – aspects of engineering that are particularly attractive to female students. In addition, specific modules are being added about ethics and inclusion, with a series of mentor-videos designed to provide role models and reduce stereotype threat. Showcasing diversity is a key criteria in mentor selection.

**LOOKING AHEAD**

All of the pilots described above have become a permanent part of the curriculum and culture at UBC.

**Recommendations and Best Practices**

Providing a community service learning opportunity can be administratively-demanding, but can create one of the richest learning experiences available at the university. Reflection sessions with appropriate support are a critical part of the CSL experience.

Look for media opportunities both around the university and around the communities students are serving in. Highlighting unique opportunities to serve can motivate young people to consider a career in STEM who otherwise would not look into the fields.

Featuring CSL opportunities in outreach and recruitment literature can also help change perceptions.

Student-driven initiatives can create the biggest culture changes in a short time period. Developing strong relationships with student leaders allows the possibility for this type of change.

Making curriculum changes is one of the most enduring ways to secure change. Changing from systemic barriers to systemic inclusion is challenging, but curriculum can be a key tool in the change.
Recommendations and Best Practices

Supporting women in the workplace is not about making policies for women – it is about making good people policies.

Showing that issues affecting women also affect other employee groups can add additional arguments to create a stronger business case for action.

For example, a preliminary study showed that highly masculine cultures were detrimental to both men and women, with men experiencing more health symptoms (Hall, Schmader, & Craft (2013). “Engineering Equality,” Society for Personality and Social Psychology Annual Meeting).

With regards to work-life balance, surveys of millennials reveal expectations for benefits similar to those women in STEM groups are advocating for. (PriceWaterhouseCoopers (2011), “Millenials at work”).

Most companies want to improve their employees’ workplace experiences. How? EES is finding answers. Some good places to start:

- Use inclusive imagery and pronouns in corporate communication.
- Provide training on unconscious (implicit) biases. There are many online resources, including Project Implicit from Harvard and webinars from Facebook.
- Before reviewing resumes for new hires, anonymize them, removing names and gender-identifiers.
- Provide copies of Gender Diversity 101 papers (Appendix 10) to your teams.

Original Objective:

RETENTION: EXAMINE INDUSTRY WORKPLACE EXPERIENCES AND BEST PRACTICES

FEATURED SUC CESS:
ENGENDERING ENGINEERING SUC CESS

Engendering Engineering Success (EES) aims to identify which organizational practices best predict an inclusive and supportive workplace culture that maximizes organizational commitment and productivity for both men and women. Bringing together non-profits, academe from several disciplines, and industry, Engendering Engineering Success is a Social Sciences and Humanities Research Council of Canada Partnership Development Grant, which significantly extends our ability to analyze workplaces and communicate best practices to industry. The grant is worth $193,372, combined with industry support of $112,060, for a total of $305,432 in funding.

Dr. Croft is the Principal Investigator of the grant. Co-Principal Investigators are Dr. Michelle Inness, University of Alberta School of Business; Dr. Toni Schmader, University of British Columbia Department of Psychology and Canada Research Chair in Social Psychology; and Dr. Valerie Davidson, University of Guelph Professor Emerita School of Engineering. Our work is supported by: Engineers Canada, CWSE National Network, Canadian Centre for Women in Science, Engineering Trades and Technology, Mining Industry Human Resources Council, Enbridge Pipelines Inc., WorleyParsons Canada. Over thirty additional industry partners are corporate participants in the studies, but cannot be named due to research ethics provisions.

EES builds on previous collaborative research on Health and Well-being in the Workplace with Professor Toni Schmader, Canada Research Chair in Social Psychology, investigating ways in which workplace social interaction contributes to the health and career satisfaction of professional engineers, especially women. Findings indicate that negative interpersonal experiences, such as workplace exclusion, may be significant predictors of physical and mental health, even after controlling for fitness and lifestyle factors. Moreover, negative experiences may affect women differently than men, possibly reducing commitment to remain in the same job. These were published in the journal of Social Psychological and Personality Science in 2015.

LOOKING AHEAD

The EES grant extends beyond the CWSE (BC/Yukon) and work will continue through it. There are plans to continue a full Partnership Grant application.

LEARN MORE

www.wwest.ca/ees

EES is actively recruiting companies to participate in this study until December 2015. Please contact ees.research@mech.ubc.ca if you would like to participate.
## RETENTION: EXAMINE ACADEMIC WORKPLACE EXPERIENCES AND BEST PRACTICES

### FEATURED SUCCESS: UBC CLIMATE STUDY

In 2012/2013, the UBC Faculties of Applied Science and Science (Vancouver campus) jointly assessed the working climate and status of equity and diversity for their faculty members in the Science and Engineering departments and affiliated major research centres. Dr. Croft co-led this study with the Associate Dean of Faculty Affairs in Faculty of Science.

The overall goal of this study was to identify potential gaps and best practices and to develop recommendations for the Faculties’ efforts to advance equity, diversity and working climate for faculty, in alignment with UBC’s employment equity and respectful working environment goals. Six main findings were identified, including that “averaged over the current cohort and adjusted for leaves, women engineering faculty achieve tenure more than one half year later than men faculty. As well, on average women faculty remain in the associate professor rank prior to promotion over two years longer than men faculty.”

This study was financially supported by the Deans of Science and Applied Science at UBC as well as the UBC Equity Enhancement Fund. Dr. Croft also co-chaired the UBC Applied Science Working Climate and Equity Committee, charged by the Dean with preparing the survey and developing an action plan to address the findings of this study.

### FEATURED SUCCESS: PROMOTION TO PROFESSOR

Promotion to Professor was a national, three-day event for women Associate Professors in science and engineering who are working towards promotion to the rank of Professor. Two optional activities were also made available to enhance the participant experience. Sixteen participants attended from BC, Quebec, Ontario and Alberta, from both engineering and science faculties.

The full day workshop took place on May 20th from 8am to 5pm. It included workshops and panels from 10 senior academics and administrators from UBC, Harvey Mudd College, and the University of Guelph, reflection activities, and group discussions.

Workshop and panel topics included:

- Researching and Understanding the Criteria for Full Professorship
- Managing your Research Reputation and Getting Recognition
- Service, Administrative Duties and Teaching
- Work-Life Effectiveness
- Negotiating Workload
- How to Deal with Politics
- Creating a Plan: The Package, the Letter and Timing
- Burning Questions Panel

In addition, participants were invited to an evening reception on May 19th, 2015 to network with each other, senior peers, and UBC administrators. On May 21st, participants met individually with CV mentors (women full professors at UBC) to receive individual coaching.

### LOOKING AHEAD

The UBC Applied Science Working Climate and Equity Committee will continue its work. A detailed report on the Promotion to Professor workshop has been provided to the National Network of Chairs for Women in Science and Engineering, including copies of materials.
Cited claims are always considered more credible, even when no one checks the citations. In addition to documents like our infographics, consider adding citations to the notes for presentations.

Careful use of a strong brand adds credibility to documents like these. Co-branding opportunities lend the weight of multiple brands to the product, and benefit both organizations.

It is ideal when a document can comprehensively answer a question, but not provide too much excess information. Each infographic was kept focused to maximize impact.

Making all publications available for free, at least in electronic form, encourages people and organizations to refer to them and share them with their networks, improving dissemination.

WWEST strongly recommends keeping our Gender Diversity 101 infographics handy at your desk, on your laptop, and in your briefcase. Consider carrying an extra copy to share!

**Original Objective:**

**RETENTION: DISSEMINATE BEST PRACTICES**

**FEATURED SUCCESS: GENDER DIVERSITY 101**

When interacting with business leaders and professionals, it was evident that clear, concise fact sheets backed up with full citations would lend much more credibility to our efforts. Seven topics have been created to date: Unconscious Bias, Mentoring Works, Stereotype Threat, The Business Case for Gender Diversity, Gendered Language, Stereotype Awareness for Hiring Committees, Understanding Workplace Diversity, and What is Engineering?

The infographics were released to strong reception, and we have excellent feedback from industry, regulatory organizations, and non-profits. Over 2000 copies of the fact sheets have been distributed to date.

A co-branding initiative was started to provide aligned organizations an opportunity to sharing the infographic content.

Confirmed co-branding partners include: UBC Engineering, the Engineering Leadership Council (professional group), eng-cite, APEGBC (limited topics), Society for Canadian Women in Science and Technology, WISEAtlantic (CWSE Atlantic), and the Ontario Network of Women in Engineering. A distribution agreement, without co-branding, has also been set with the Mining Industry Human Resources Council.

“When SCWIST was invited to speak to the House of Commons Standing Committee on the Status of Women in April 2015, the development of our messaging started with the white papers that have been developed by WWEST. These papers gave us validated statements that were easy to quote on important topics such as Unconscious Bias, Stereotype Threat, and the Business Case for Gender Diversity. In preparation for the question and answer portion of the appearance before the Committee, we took little more than these white papers as they had any additional facts we may require and the sources were easily quoted on the fly as well. Thanks to these resources, SCWIST was heavily quoted in the Committee’s final report on Women in Skilled Trades and Science, Technology, Engineering and Mathematics Occupations.”

- Danniele Livengood, Secretary
  Society for Canadian Women In Science and Technology (SCWIST)

**LOOKING AHEAD**

Co-branding agreements are in perpetuity – partners have the ability to continue to distribute, print, use, and promote the fact sheets after the end of the CWSE (BC/Yukon).

The gender diversity 101 publications will also be packaged in a self-published book, and distributed to libraries, post-secondary institutions, and industry groups. In addition, the NSERC CWSE for Quebec will be translating the materials into French.

The Engendering Engineering Success research project will also be adopting this model of knowledge dissemination, by creating similar fact sheets.

**LEARN MORE**

Please see Appendix 10.
Impact Update
September 2010 - August 2015

sharing proven practices
- 13 committees
- 17 publications (academic & mainstream)

shining a spotlight
- 164 lectures, panels, courses, & workshops
- 83 mainstream media features and interviews

building momentum
Beyond the original NSERC & Matching grants:
- 1 major grant received
- Over 750,000 dollars leveraged as a direct result of the Chair program

building networks
- 11 companies
- 82 organizations
- Sum of connections actively maintained

reaching out
- over 3000 youth and parents
- 6800 post-secondary students
- 3100 industry professionals
- 2100 academics
- 280 teachers
- 70 academe decision-makers
- 15,600 direct interactions

wide online engagement
- 250+ likes
- 325+ followers
- 930+ tweets
- 205 of our tweets were retweeted 292 times

our most popular post reached 2994 people, resulting in 198 clickthroughs

over 10,000 unique web views
over 23,000 newsletters delivered
65 avg. impressions/day
1430 avg. viewers/month
In August 2015 alone, our “Inspirational women in STEM” board resulted in 1134 impressions
APPENDICES

1. Budget
2. Staff
3. First 24 Month Report
4. Second 24 Month Report
5. Final Year Newsletter
6. Publications
7. Media
8. Awards
9. Workshops
10. Gender Diversity 101
11. STEM Organizations in BC, Yukon and Canada
12. WWEST Partners Report Summaries
13. Pre-Print: Impact of a Women in STEM Conference on Two Indicators of Career Persistence: Evaluation Design and Results
APPENDIX 1:

BUDGET
<table>
<thead>
<tr>
<th>Category</th>
<th>Original Budget</th>
<th>Actuals as of September 30 (including completed but unposted transactions)</th>
<th>October - December Projection</th>
<th>Actual + Projection</th>
<th>Original Budget - Combined</th>
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<td>Staff</td>
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<td>Chair Holder (~40% salary and benefits)</td>
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<td>Manager salary and benefits**</td>
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<td>Awareness and Outreach</td>
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*Paid directly from the Dean of the Faculty of Applied Science, UBC.

**Budget item was not on original Chair application, but $20,000/year of funding was provided by NSERC beginning in year 1 to sustain the Chair’s primary research. UBC matched this amount (paid directly). An additional $5000 was received in year 5 from NSERC.

^This line was redefined to include all staff positions (as opposed to research or student positions). Through much of the Chair, WWEST was supported by a 50% time Manager and a 50% time Program Assistant.

Note on significant deviations from budgeted amount:

WWEST spent significantly less than anticipated in two key areas: social science research support and travel. In social science research support, less funding was required than anticipated because the Chair was awarded a Social Sciences and Humanities Research Council of Canada Partnership Development Grant of $197,732, plus partner contributions and in-kind support valued at over $100,000. Travel was under-budget as we were often able to secure funds from other sources. The staff salary line was also slightly below projection, with staff time replaced by student project assistants.

This savings allowed WWEST to increase expenditures in other key areas. Student project assistants were identified as a key area for investment. In addition to providing valuable training and experience to undergraduate and graduate students, student assistants were able to serve as role models and mentors to their peers and youth. Student assistants also made it possible for WWEST to develop more communication materials, reach out to more communities, increase the number of outreach events we supported, and deliver programming and advocacy to a broader audience.

WWEST also invested further in workshop development and delivery, using these outreach and leadership development programs as both pilot programs and as a participant pool for our research activities.

WWEST plans to spend remaining funds this fall publishing and distributing two books as part of our research dissemination plan. One book covers the WWEST Partners program, and will serve as a directory of BC and Yukon organizations that advance women in science and engineering. The second will be a bound version of our Gender Diversity 101 cited, visual guides to topics related to women in science and engineering. The bound version will include reflections and contributions from community leaders, and be distributed broadly, including to libraries and schools.
APPENDIX 2:

STAFF
The biggest contributor to the success of the WWEST Program was having a dynamic, flexible team, including a manager and program assistants that were able to lead, shape, and coordinate large portions of the program, activities, and research.

The general organizational structure is shown in Figure 1. Note that not all positions existed at all times:

A Manager position was integral to the organization of WWEST, allowing WWEST to have a much higher level of engagement and impact than would be possible without the additional leadership and expertise. The Manager worked alongside the Chair on strategic vision and program planning; managed the team and logistics, ensured program resources were allocated appropriately to meet the goals and objectives of each project, designed and delivered workshops and lectures, created communication pieces, and represented the program at events.

As the Manager position was part-time during the first three years of the Chair, a Program Assistant position was created to have additional permanent staff support. This provided professionalism and consistency in contact and communications, improved WWEST’s ability to have a presence at events, and ensured we had the resources to properly prepare for all events, pilot programs, and speaking engagements.

In addition to the two staff positions, WWEST employed and trained a large number of undergraduate and graduate students. In addition to helping plan, prepare, and deliver workshops, events, communications, or other initiatives, each student was able to develop skills related to their educational or career goals.

In Fall 2013, Dr. Sheryl Staub-French, Associate Professor of Civil Engineering at UBC was named a WWEST Faculty Associate, supported by the Dean of the Faculty of Applied Science. She represented WWEST at a number of outreach events and speaking opportunities we would otherwise be unable to accommodate. In June 2014, Sheryl was named the Goldcorp Professor for Women in Engineering at UBC. The Professorship, under the banner eng•cite, will be continuing many of the events developed by or with WWEST.
STAFF AND STUDENTS CONTRIBUTING TO WWEST

- **Manager:**
  - Jennifer Pelletier (50% time July 2010 - January 2014; full time to September 2015)

- **Program Assistants:**
  - Heather Gerrits (July 2010 – July 2011, 50% time)
  - Kyle Philibert (July 2011 – April 2012, 50% time)
  - Justin Yang (May 2012 – July 2013, 50% time)
  - Janet Fraser (September 2013 – March 2014, 50% time WWEST / 50% time Network Support)

- **Graduate Students:**
  - Rebekah Parker – Education & Outreach Coordinator
    Research Masters candidate in the Faculty of Education Eco-Justice and Sustainability program.
    May 2013 – August 2015; 20 hours/week in summer, 10 hours/week during term
  - Vivian Meng – Measurement and Evaluations Coordinator
    Was a Master of Science candidate in Statistics
    September 2013 – August 2014, 5-10 hours/week.

- **Undergraduate Students – 10 hours / week (20 hours / week in summer) unless otherwise noted:**
  - Robyn Choi – Social Media Coordinator - computer science student
    May 2014 – August 2015
  - Tanika Chadha – integrated engineering
    January – April 2014
  - John Koo – mechanical engineering
    January – April 2013
  - Anoushka Rajan – mechanical engineering
    May 2011 – December 2012; summer terms were full-time (Co-op)
  - Mina Arabkhedri – mechanical engineering
    May 2012 – August 2012
  - Andrea Monssen – history and economics
    January 2012 – April 2012
  - Jonathan Leung – mechanical engineering
    September 2011 – December 2011
  - Katherine Dennert – civil engineering
    September 2011 – April 2012
  - Amanda Li – mechanical engineering
    May 2011 – August 2011
  - Courtney Tiechko – biology
    January - April 2011
  - Kelsey McMartin – mechanical engineering
    September 2010 – April 2011
  - Krista Thielmann – mechanical engineering
    September 2010 – April 2011

OTHER SUPPORTING PERSONNEL

- National Network coordination resided with the CWSE (BC/Yukon) from 2012 – February 2015. Jasreyman Noor Teja was the Network Program Assistant (50% time) from January 2012 – June 2013, with responsibilities residing within the manager role outside this period.

- Community-Based Experiential Learning Officers Alaya Boisvert and Jason Penner provided support and leadership for all Community Service Learning Activities.

- Postdoctoral Fellows Chris Parker, Amir Haddidi, Brian Gleeson and Justin Hart supported the Chair by providing leadership in the CARIS Lab, allowing Dr. Croft to maintain her research profile and experimental
robotics program while leading the CWSE (BC/Yukon) program. The postdoctoral fellow position also made feasible the numerous robotics demonstrations to the general public at open house and outreach events.

- Engendering Engineering Success team members work closely with the WWEST team. Trainees affiliated with the project who are located at UBC include William Hall (Ph.D. candidate), Kate Block (Ph.D. candidate), and Sara Ahmadian (Undergraduate Academic Assistant).

**EXAMPLES OF ORGANIZATIONAL STRUCTURE AT DIFFERENT POINTS IN TIME**

![Diagram showing organizational structure at different points in time.]

*Figure 2: The 2010 Organization Structure of WWEST.*

![Diagram showing organizational structure at different points in time.]

*Figure 3: The Spring 2014 Organization Structure of WWEST.*
APPENDIX 3:

FIRST 24 MONTH REPORT
NSERC Chair for Women in Science & Engineering, BC and Yukon Region

24-MONTH PROGRESS REPORT

September 1, 2012

Chairholder:
Dr. Elizabeth Croft, Ph.D., P.Eng., FEC, FASME
NSERC Chair for Women in Science and Engineering (BC & Yukon Region)

Thank you to all of our Sponsors:

Lead Sponsors:
UBC Faculty of Applied Science, Engineering
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WorleyParsons Canada Ltd.
Teck Resources Limited
Stantec Consulting
Dr. Ken Spencer
Henry F. Man

Contributing Sponsors:
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Mr. Stanley Cowdell
Division for Advancement of Women in Engineering and Geoscience
Nemetz (S/A) & Associates Ltd.
Glotman Simpson Consulting Engineers

Supporters:
Karen Savage, P.Eng.
Golder Associates Ltd.
1 Highlights

As the NSERC Chair for Women in Science and Engineering (BC & Yukon Region), Dr. Croft founded Westcoast Women in Engineering, Science, and Technology (WWEST) in order to: attract, recruit, and retain women in engineering and science. WWEST works at national, regional, and local levels with organizations engaged in increasing the number of women in science, engineering, and technology (SET) disciplines through multilateral partnerships spanning community, academic, and private sector partners. WWEST serves as the premier hub for activity and dialogue about meaningful inclusion and increased participation of women in SET disciplines on Canada’s west coast. Nationally, Dr. Croft leads the NSERC CWSE national network and serves on the Engineers Canada Women in Engineering Committee.

A research highlight is our collaborative project on Health and Well-being in the Workplace with Professor Toni Schmader, Canada Research Chair in Social Psychology, investigating ways in which workplace social interaction contributes to the health and career satisfaction of professional engineers, especially women. Preliminary findings indicate that negative interpersonal experiences, such as workplace exclusion, may be significant predictors of physical and mental health, even after controlling for fitness and lifestyle factors. Moreover, negative experiences may affect women differently than men, possibly reducing commitment to remain in the same job.

WWEST has worked with the Canadian Centre for Women in Science, Engineering, Trades and Technology (WinSETT Centre), to present six “Becoming Leaders” workshops, a professional development opportunity for women in SET. These workshops were hosted with industry partners and addressed challenges and solutions for women’s success in SET careers. WWEST measured statistically significant positive changes in participant occupational self-efficacy across a five of six key indicators and presented these findings at the CCWESTT conference in May 2012. WWEST will highlight new WinSETT workshops at the upcoming APEGBC Annual General Meeting in Victoria, October 2012.

In September 2011, WWEST organized the second biennial Creating Connections conference, at UBC, convening 150 female engineering students, new immigrants, women in transition, and industry professionals for a full day of networking, personal and professional development, and leadership modeling. WWEST is organizing the next Creating Connections conference (May 11, 2013) and has engaged key personnel from partner groups (including SFU, UVic, SCWIST, DAWEG, WIE-VR, Women in Mining, etc.) to take on leadership roles on the planning team. The aim is for this conference to be self-sustaining by the time that the Chair is complete, meeting the larger CWSE Network objective for regional conferences to complement the biennial CCWESTT conference.

The Chair has worked closely with the Faculty of Applied Science Engineering Community Service Learning (CSL) Working committee to advocate for and develop CSL curriculum throughout engineering. Dr. Croft spearheaded the development of a CSL unit taken by all second year Mechanical Engineering students since 2010 while supporting development of CSL programming across the Faculty. She also developed and delivered a set of two, CSL-based Global Engineering Leadership electives for senior students delivered in 2011 and 2012. Since the beginning of the Chair, over 1000 students in engineering have participated in CSL engineering courses.

The WWEST Partners grant program fosters exciting new initiatives that promote the outreach, recruitment, and retention of girls, young women, and industry professionals in SET. Partners work across SET disciplines with a broad range of target demographics, ranging from GEERing UP! UBC Engineering and Science for Kids, bringing hands-on science to youth in Greater Vancouver, to the Society for Canadian Women in Science and Technology (SCWIST), supporting students and industry professionals. All WWEST Partners participate and benefit from biennial training sessions provided by WWEST covering key topics like succession planning, fundraising best practices, succession planning and project management.
2 Progress to Date

2.1 Contributions

WWEST has made broad, national and regional contributions through a combination of policy and advocacy work, coordinating and building capacity in regional activities, and proving pilot projects to assist in mainstream integration. Our work spans multiple age groups – early outreach, post-secondary, and industry – and sectors, concentrating on areas of strategic importance to our region: mining, utilities, and consulting engineering. Each one of our activities contributes towards one or more of the overall goals of the NSERC Chairs for Women in Science and Engineering program.

2.1.1 Develop, implement, and communicate strategies to encourage female students in the K-12 system to consider careers in SET.

WWEST has undertaken three distinct strategies to encourage female, K-12 students to consider futures in SET, all of which leverage other stakeholder groups to both increase our reach as well as encourage the long-term continuation of our programs.

Firstly, we have developed a teacher training session with UBC Engineering Recruitment, in which we introduce easy to implement, affordable, SET classroom activities, directly correlated with the Prescribed Learning Outcomes of the high school curriculum, to teachers in a Professional Development Workshop format. The workshop demonstrates the activities and discusses how they can be used to encourage and foster critical inquiry and thoughtful reflection by students about the role of SET in society. A short keynote address by Dr. Croft emphasizes the role of a teacher in a student’s decision to pursue a future in SET and how an understanding of how SET serves our society can be particularly encouraging to women who are considering a SET career.

Another successful initiative has been our WWEST Partners program, a program closely aligned with the objectives of the NSERC CWSE program. WWEST Partners are a network of non-profit, institutional, and not-for-profit groups in the region whose work is concerned with outreach or retention. The WWEST Partners program seeks to build a community of practice and to provide financial and expertise resources that help community members to learn, share, and disseminate best practices and build towards the long-term sustainability of their respective programs. WWEST provides up to three years of seed funding (generally with annually declining amounts to encourage partners to seek alternative funding sources), semi-annual training sessions on selected topics, and networking and collaborative activities among respective groups. Our WWEST Partners in the K-12 outreach area include:

- UBC GIRLsmarts Computer Science workshops
- Girl Guides of Canada workshops at SOAR international camp
- Girls Exploring Physics workshops at Simon Fraser University
- UBC Physics and Astronomy Outreach Program
- GEERing Up! UBC Engineering & Science for Kids workshops and camps in Vancouver, Kelowna, and Prince George
- IEEE Women in Engineering STAR outreach program

In addition, WWEST actively seeks and participates in activities organized and coordinated by regional organizations, providing booths, role models, speakers, leaders, publications, or other content for their activities. For instance, we have presented at events that are a part of Engineering Week, a week-long celebration of the engineering profession organized in BC by the Association of Professional Engineers and Geoscientists of BC (APEGBC), such as the EFest fair at the downtown Vancouver Public Library and a popsicle stick bridge-building contest on the Sechelt Peninsula. WWEST also presented at and providing mentors for the UBC Go Eng Girl! Conference for high school students. By making partnership a cornerstone of our outreach strategy, we have been able to maximize our impact, share our expertise and best practices in a very personal and practical way, and build capacity in our region to continue developing and holding events to support women in SET after the end of our mandate.
2.1.2 Develop, implement, and communicate strategies to increase the enrolment of women in SET undergraduate and graduate programs

Based on social science research on key factors for career selection by young women, WWEST has strategically focused on advancing curriculum that promotes SET as a welcoming career for young women, and that promotes opportunities to make a positive impact on society. The Chair has utilized her position to advocate for and establish courses integrating Community Service Learning (CSL) into curricula across the Faculty of Applied Science at UBC. She has served on the CSL working committee since its inception in 2010 and worked very closely with Alaya Boisvert, the Faculty CSL coordinator, to share best practices across the faculty and to link CSL pedagogy with the Graduate Attributes required for accreditation of engineering programs. CSL is now a core component the second year Mechanical Engineering Program, in third- and fourth-year mechanical engineering courses, and courses in Chemical and Biological Engineering and Civil Engineering. Furthermore, the Dr. Croft has developed a set of two CSL “Global Engineering Leadership” (GEL) courses that are taken as electives by senior students. Dr. Croft has also partnered with the UBC International Service Learning (ISL) office to include a 6 week ISL placement in Mexico in the second GEL course, allowing students to utilize their engineering skills in a service learning context for an international development project. Since the start of the Chair, nearly 1000 UBC Engineering students have benefitted from participating in CSL learning opportunities in APSC, more than tripling the annual number of engineering students participating in CSL. We have also seen a marked increase of women students entering Mechanical Engineering – with traditionally very low enrollment of women, up to 18% from a pre-chair average of about 13%.

More broadly, our outreach to this group parallels our strategy for K-12 students. Because there is a strong group of organizations working in this area, we have focused on supporting the WWEST Partners programs. In particular we have brought partners together to co-host events, provided connections with sponsors and speakers, and participated in WWEST Partner events and activities as speakers, mentors, presenters, facilitators, or in other invited roles.

Our WWEST Partners in the post-secondary area outreach and support are:

- UBC-O Women in Science and Engineering career workshops and mentoring
- UBC WISE networking night
- BC WIE and SFU WEG Enhancing Collaboration Initiative
- SFU WEG and SFU WICS Corporate Opportunities Program
- BC Young Women in Physics Canada Conference
- Leadership through Diversity at the University of Victoria

Furthermore, Dr. Croft has been a keynote, presenter, or mentor at 15 events for over 1,100 students at campuses throughout the region including multiple presentations to the Women in Science and Engineering Groups at UBC, UBC Okanagan, UVic, SFU and BCIT as well as college groups. In addition, WWEST hosted an informal panel and lunch for incoming female university students and senior high school students during the UBC Engineering Open House. Through our WWEST partners program we have facilitated close networking and cooperation between these WIE/WISE groups across the region, leading to collaborative events such as a recent trip to Boeing in Seattle. By bringing these groups together we help to increase “critical mass” of women students events, an important strategy to reduce isolation, improve networking, and support recruitment and retention.

2.1.3 Develop, implement and communicate strategies to increase the profile and retention rate of women in science and engineering positions

Our focus on increasing the retention rate of women in SET has centered on the young professional level – women who have been working in industry for three to seven years. The core of these activities has been implemented in cooperation with the WinSETT Centre. We have held six Leadership Development Workshops in four different communities, and assisted with continuous improvement of the material and delivery, building a set of best practices that is being implemented across the country.
We also added a more scientific approach to workshop impact measurement to help validate their impact. Our Self-Efficacy Study goes beyond measuring outcomes based on participant direct feedback, by measuring changes in career self-efficacy, a predictor of persistence in a career. We adapted Rigotti, Schyns & Mohr’s *Occupational Self-Efficacy Scale: Structural and Construct Validity Across 5 Countries* (2008) into a specific pre- and post- model and obtained UBC Behavioural Research Ethics Board approval for a study on the impact. We have found that there is a statistically significant change in self-efficacy before and after the intervention, and are now engaged in follow-up research to analyze whether those changes persist. Our findings were presented at the CCWESTT conference in May 2012. WWEST has also invited to present the WinSETT workshop series, our self-efficacy findings, as well as our workplace research study (described in Section 2.1.4) with Professor Schmader in a series of three workshops at the APEGBC Annual General Meeting in October 2012. This work will also be profiled in an upcoming issue of the APEGBC bimonthly Magazine “Innovation.”

WWEST Partners groups also actively engaged with profiling and retention activities are:
- The Society for Canadian Women in Science and Technology (SCWIST)
- Women in Engineering, Vancouver Region (WIE-VR) in partnership with the Division for Advancement of Women in Science and Engineering (DAWEG)

### 2.1.4 Develop, implement, and communicate strategies to eliminate barriers for women who wish to pursue careers in science and engineering

WWEST actively engages industry partners to identify and eliminate barriers for women in SET. Activities in this area include the Women in Engineering Leadership Forum, research on engineering workplaces, and the UBC climate studies in Science and Engineering.

The Women in Engineering Leadership Forum has a membership of high-profile and highly successful women in SET, who meet several times a year to develop strategies, suggest policies, and gain ideas about how to reduce barriers for other women in their organizations.

In cooperation with Professor Toni Schmader, CRC Chair, and Ph.D. Candidate William Hall from the UBC Department of Psychology, WWEST is investigating stress in engineering and science workplaces including some of our Chair industry partners. The *Health and Well-being in the Workplace* project examines two key aspects of how a workplace might counteract daily stress and contribute to your health and well-being: the policies that promote a safe, rewarding, and inclusive environment and the interactions you have with others during your day. The results and best practices will be published and shared widely including dissemination to industry via APEGBC channels as noted in Section 2.1.3.

Dr. Croft is a co-principal investigator of the *Faculty Working Climate* study undertaken in the Faculties of Science and Applied Science at the University of British Columbia. This study seeks to identify, understand, and remediate aspects of the academic climate that are creating barriers. The faculty survey has been prepared, received university behavioural research ethics approval, and will be launched in September 2012. This study is financially supported by the Deans of Science and Applied Science at UBC as well as the UBC Equity Enhancement Fund. Dr. Croft also chairs the UBC Applied Science Working Climate and Equity Committee, charged by the Dean with preparing the survey and developing an action plan to address the findings of this study.

### 2.1.5 Develop, implement, and communicate strategies to promote the integration of female students and professionals both within and outside academia

Work to increase the integration of women into fields traditionally associated with men has been a priority for WWEST. We have organized a number of dual gender events such as a teacher’s conference, EFest at the Vancouver Public Library, and open houses. These events provide WWEST the opportunity to communicate the challenges and barriers to full female participation in SET both in academia and in industry. Moreover, WWEST specifically seeks a number of mentors and role models, both men and women, from all walks of life who are champions for inclusivity to serve as supporters and presenters at
our events, highlighting the fact that diversity is defined broadly and the integration of women is everyone’s concern. In addition, Dr. Croft presents an annual a salary seminar to female upper-level Engineering students for a number of years, focusing on ensuring that young women transitioning into their first professional roles have the tools to make informed decisions about their futures in industry and academia. This seminar is now offered at SFU and UBC Okanagan and is available on the WWEST website.

WWEST has sought to help enact change at the organization level in the community, not only at the level of individual women. By doing so, WWEST seeks to educate and equip change leaders in organizations in order to generate cultural shifts towards inclusivity, diversity, and support. Members of the Chair’s Steering committee include the Deans of Applied Science (Engineering) from all three major engineering schools in BC, the Dean of Science at UBC, leaders from major employers (BC Hydro, Worley Parsons, Stantec), industry advisory (DAWEG) and student representatives. Through our Biannual meetings, the Chair has worked with these key leaders to promote the Engineers Canada 30x30 plan (30 percent licensed female engineers by 2030 – see Section 2.1.7 for details). At our most recent advisory meeting the Dean of Applied Science proposed to double the intake of women into engineering at UBC by 2020. Dr. Croft is working closely with the Assistant Dean of Student Services to develop this plan.

Dr. Croft is also working with council members from the Association of Professional Engineers and Geoscientists of BC, including the current president to develop an action plan to attract, engage and retain women in the profession. These recommendations are planned to go before council in 2012/13.

2.1.6 Providing successful and accomplished female researcher role models

Dr. Croft is a well-recognized researcher and engages in a number of profile-raising events and activities. She is frequently featured in the media, speaks regularly at community events, and has been featured in both a local museum exhibit as an inventor and as a BC Year of Science Featured Scientist. She has been a keynote speaker for events like the SCWIST 2011 Gala, and the Association of Professional Engineers and Geoscientists of Alberta 2011 Mentoring Conference.

WWEST has also played a very active role in nominating local female industry and academia leaders for awards, and raising their profile in the community through guest speaking opportunities, local events, and web profiles. Recent WWEST nominations include: Catherine Roome, CEO BC Safety Authority, winner of the APEGBC McLachlin Award (2011)– the premier career award for an engineer in BC, winner of the Engineers Canada Award for the Support of Women in Engineering (2012) and a YWCA women of Distinction Nominee (2012)); Margaret Li FEC, Past APEGBC president, winner of the APEGBC Professional Service Award (2012); Robin Farnworth, winner of the UBC Engineering Young Alumnus Award (2011); Nicole Kohnert, nominee for UBC Alumni Award of Distinction. Dr. Croft also oversees the Canadian Federation of University Women (West Vancouver Chapter) Education Award nomination process at UBC. In 2011 three UBC Engineering students received a $1000 award from this group.

2.1.7 Developing and implementing a communication and networking strategy to ensure a regional and national impact on opportunities

WWEST functions as a regional and national hub for communications about the issues affecting women in SET, liaising with stakeholders from ranging from government to industry, from academia to the general public.

The WWEST Network is composed of individuals who are subscribed to our email digest or are connected to us through social media (Facebook, Twitter, and LinkedIn). The Network focuses on the dissemination of timely information to individuals about new initiatives in women in SET as well as news about our partners and stakeholders. The Network comprises the backbone of WWEST’s communications strategy, enabling Network members to remain apprised of ongoing developments in women and SET. The WWEST Partners, a key networking group described in 2.1.1, are an important part of the Network, contributing more than three quarters of the content.
The WWEST Council is comprised of representatives from the Partners group as well as a number of key stakeholder organizations. The goal of this 22 member Council is to be an information and support network for groups engaged with the advancement of west coast (BC/Yukon) women in SET, providing a point-of-contact for coordination of programming and reporting on opportunities of interest to all constituent groups. WWEST facilitates the work of the Council by serving as a central communications hub and coordinating shared activities. Through the WWEST Council we have expanded networking opportunities for women in SET, received input on policy development to address systemic inequities, and disseminated business case and best practice information to support girls and women throughout the SET community.

Dr. Croft has taken the role of Lead PI for the CWSE National Network, facilitating interactions among the five regional Chairs to enhance the visibility and impact of CWSE activities at national and international levels. The regional Chairs work together on a number of national initiatives: research projects, dissemination of current statistics and research findings and liaison with national organizations (e.g. CCWESTT, Engineers Canada) and international (e.g. INWES). Dr. Croft has served as the Network’s liaison to Engineers Canada’s Women in Engineering Advisory Group and has presented at CCWE+20 and CCWEST conferences on behalf of the Network.

As Network lead, Dr. Croft has gathered a team to work on a SSHRC PDG grant (deadline November 1, 2012) currently titled “Bridging the Gap: Reworking the Social Contract for Women in Engineering Workplaces – Moving from Attrition to Retention and Advancement”. Participants on this grant are Valerie Davidson, Toni Schmader (UBC Psychology), Michelle Innis (U of A Business), and the NSERC CWSE Network. WinSETT, the Engineers Canada WIE committee, and the Mining Institute Human Resource Council are proposed as partners for this grant. Focusing on women in industry, this project will characterize organizational best practices, analyze interventions, and perform workplace culture studies, while building a national team comprising institutions, government and industry groups and major SET companies to create workplace culture change which welcomes and supports diversity as an economic driver. In concert with the Engineers Canada vision of 30% licensed female engineers by 2030; this grant aims to have a significant positive change not only for engineering, but for all of SET. As a deliverable, the team will develop roadmap for a full SSHRC Partnership Grant. The larger vision of the Partnership Grant will be to mobilize resources, policies and broad social consciousness to reverse attrition and address the systemic “chilly climate” that continues to freeze women out of SET careers in Canada.

Dr. Croft is also working with other chairs on the CWSE Network Career Transitions Survey of undergraduate (final year) students in engineering and computer science to evaluate their education experiences, career intentions and workplace expectations. Findings from this study were presented at the ICWSE 15 conference, Adelaide (Australia), July 19-22, 2011: Fender, J., Davidson V., Vassileva, J., Ghazzali, N., and Croft, E. “Perceptions and Experiences of the Workplace among Canadian Computer Science and Engineering Students – A Gender Analysis.” With Nadia Ghazzali and Valerie Davidson, Dr. Croft is also developing National Institution Support Indicator Surveys for faculty, institutional leaders and students. This work, in part, parallels the Faculty Working Climate study described in Section 2.1.4. These surveys will be disseminated through the CWSE national network for use as both a national survey and also as templates for internal university use.

Dr. Croft serves as a member of the Standing Committee on Women in Engineering (a committee of the board of Engineers Canada) and serves on the Research Subcommittee. In May 2011 the Board of Engineers Canada approved the formation of this committee in order to carry out an action plan towards the goal of achieving 30% women in engineering by 2030.

WWEST coordinated the production of a twelve page “Coast to Coast” magazine summarizing the efforts of the CWSE Network, distributed to all participants at CCWESTT 2012. An electronic version has been provided to the chairs and to NSERC for dissemination throughout their connections.
2.2 Objectives

WWEST’s mandate to attract, recruit, and retain women in engineering and science in BC and Yukon was proposed and enacted through three goal areas: (1) awareness and outreach via a WISE network resource, (2) recruitment via Community Service Learning Activities, and (3) retention and industry support through research and best practice dissemination. As described in Section 2.1, we have made substantial progress in all of these objectives and have made contributions well beyond these goals.

**Awareness and Outreach** through the development of networks and partnerships has been extremely successful. As described in Section 2.1.1 and 2.1.2 the WWEST Partners program has been highly successful in reaching out to many audiences. We have also established the WWEST Council with 22 members. The Creating Connections Conference series is very successful and has served as a focal point to bring together many of the stakeholder groups leading to the establishment of the WWEST Council and many new partnerships. Our professional training program for teachers also has significant multiplier effect.

WWEST recruitment goals are being met through the work described in 2.1.2, particularly the development of CSL curriculum as planned in the original proposal. Due to other curriculum constraints it was not possible to develop a first year CSL course as originally planned. However CSL curriculum has become embedded in second, third and fourth year courses across the faculty and is steadily reshaping the view of engineering as a career that truly serves society and is welcoming to diverse groups.

**Retention and Industry support** goals are being met by the research work described in Sections 2.1.4 and 2.1.7 to study and develop best practices to support women in academe and industry. However we have already moved to practical interventions – namely the Leadership Development Workshops (Section 2.1.3) to help women develop networks and strategies to remain in these careers.

In terms of success indicators, as outlined in our proposal we have used survey tools (See section 2.1.3) to evaluate our interventions and reported outcomes in yearly reports to sponsors and stakeholders (also posted at wwest.ca). We are also collecting statistics from our WWEST partner projects but, as most projects are multi-year, results are still coming in. We have developed CSL curriculum and documentation of the CSL program outcomes will follow in the latter part of the Chair mandate; meanwhile our participation rates in CSL have been excellent (Section 2.1.2). We have started to report our early research findings (Section 2.1.3 and 2.1.4) and expect that in the last three years of the Chair a greater emphasis on reporting will take place as our studies are completed.

2.3 Collaborations

As discussed in Section 2.1.7, Dr. Croft has established collaborations with all of the CWSE chairs and currently leads the network providing support, sharing resources and strategies and working together on projects such as the Partnership Development Grant, Career Transitions Survey and Institutional Indicators Surveys. On important but basic level, at the start of the three new CWSEs in Atlantic, Ontario and Prairie regions the WWEST manager, Jennifer Pelletier, spoke with the other CWSE’s new managers to share organizational best practices and strategies.

Nationally, Dr. Croft has also established strong partnerships with Engineers Canada (Section 2.1.7), and WinSETT (Section 2.1.3). Through the WWEST Council we have developed links with 22 regional groups. The WWEST Partners program currently supports 15 different initiatives run by outreach groups. This highly collaborative approach has had impact in terms of contacts with community and target groups far beyond what could ever be done by WWEST on its own.

Support of the industry partners has been excellent, through participation on the WWEST Steering Committee (Section 2.1.5), participation, hosting, and providing speakers for the Leadership Development Workshops (Section 2.1.3) and participation in the Workplace Study (Section 2.1.4) as well as participation in our many other events. Almost all of our 13 sponsors have been engaged in WWEST activities.
2.4 Team Members

A flexible team of involved, committed staff and students supports the Chairholder and the WWEST program. To ensure the team is as connected and integrated with the wider university community as possible, all staff work part time with WWEST and part time in other positions on campus (majority in Mechanical Engineering). This allows us to bring expertise and resources from a wider range of areas, have a wider skill set on our team, and gives flexibility to have additional staff on hand for events.

The team includes a Manager (part time), a Program Assistant (part time), a Community Service Learning coordinator (part time), undergraduate students (through co-op, work study, or work learn), a Ph.D. candidate, a research support postdoctoral fellow, collaborators (as described in 2.3), and casual, event-specific volunteers. As the Chair also serves as the Network Coordinator, a Network Program Assistant (part time) also works closely with the staff, under the Manager’s supervision.

The Manager position has been held by Jennifer Pelletier, who also holds the position of Manager of Undergraduate Affairs and Special Projects for UBC Mechanical Engineering. Her educational background is in adult education and project management, and she has experience in communication and engineering and science outreach. In addition to her roles in project planning and managing the program, she has made significant contributions to training workshops such as the Leadership Development Workshops presented with WinSETT, the WWEST Partners training days, and the Teacher’s Conference training. She has also been involved with our Self-Efficacy studies, and produces all of our communication pieces and graphic design elements. For her outstanding service and dedication to UBC and the faculty, staff and students that she works with, as well as her large community service portfolio, Jennifer won the UBC President’s Staff Award in 2010 and the Applied Science Staff Award (Management Category) in 2012.

The Program Assistant position has been held by Heather Gerrits (until July 2011), Kyle Philibert (July 2011 – April 2012), and Justin Yang (May 2012 to present). Each was also appointed in the Department of Mechanical Engineering as a Program Assistant in the Undergraduate Affairs office. Gerrits holds a BA in Psychology from Simon Fraser University, and played an important role in setting up administrative processes, coordinating meetings and email communication. She is now at the University of Saskatchewan. Philibert holds a BASc in Mechanical Engineering from UBC, and made contributions in the same areas, as well as playing a key role in recruitment and designing activities. He now works at Westport Innovations. Yang holds a BA (Hons) in English and a BSc in Biology from UBC. A member of the UBC Senate, he is very knowledgeable about policy creation and non-profit management, and will be contributing to the SSHRC grant discussed in section 2.1.7.

The Community Service Learning Coordinator position is situated within the Faculty of Applied Science. The position has been held by Alaya Boisvert, who has provided a great deal of support for the community service learning pilots discussed in section 2.1.2. She holds a BA in International Development from McGill and a MSc from the Blekinge Institution of Technology in Strategic Leadership Towards Sustainability.

WWEST has also hired a number of co-op, work study (domestic), and work learn (international) students annually not only to contribute to the Chair’s work but also to reach out to undergraduate students in a way that complements professional development with personal passion. Students working for WWEST have received the opportunity to build valuable on-the-job skills that are transferable into future careers in engineering and science as well as gain unparalleled insight into the ways in which diversity in these professions is an asset. For example, students have helped organize the Creating Connections conference, liaising and networking with high-profile female industry professionals and scholars leading to long-lasting professional mentorship relationships. They are also given the opportunity to share their experience and knowledge with secondary school students, teachers, their peers, and the general public. In addition to providing the skills and person hours required to complete our projects, students leave their work terms, invigorated with a sense of social justice and passion for
ensuring equity in their professions, ready to act as changemakers in whatever organization they find themselves. Our undergraduate student employees have been:

- Krista Thielmann, Mechanical Engineering, Work Study, September 2010 – April 2011
- Kelsey McMartin, Mechanical Engineering, Work Study, September 2010 – April 2011
- Courtney Tiechko, Biology, Co-op, January – April 2011
- Anoushka Rajan, Mechanical Engineering, Co-op (May 2011 – August 2011, May 2012 – August 2012), Work Study (September 2011 – April 2012)
- Amanda Li, Mechanical Engineering, Co-op, May 2011 – August 2011
- Katherine Dennert, Civil Engineering, Work Study, September 2011 – April 2012
- Jonathan Leung, Mechanical Engineering, Co-op, September 2011 – December 2011
- Andrea Monssen, History and Economics, Co-op, January 2012 – April 2012
- Mina Arabkhedri, Mechanical Engineering, Work Learn, May 2012 – August 2012

Ph.D. candidate William Hall from the Department of Psychology is a leader in the workplace study described in 2.1.4. Working under our collaborator Professor Toni Schmader, CRC, Hall has developed the study protocols, secured ethics approval, and is collecting the necessary data. Postdoctoral Fellows Chris Parker (2010-2012) and Amir Haddadi (2012-) have supported the Chair enormously by providing leadership in the CARIS Lab, allowing the Chair to maintain her research profile and experimental robotics program (see Section 2.6) while leading the CWSE BC/Yukon program – something that would not have been feasible without their support. In addition, the postdoctoral fellows have provided numerous robotics demonstrations to the general public at open house events and, in particular, to participants in the GEEring Up! summer camps, Teck Trek, and Aboriginal Summer Science program. Chris Parker has represented the CARIS lab on CBC Radio’s “Spark” program.

The CWSE Network Program Assistant position is currently held by Jasreyman Noor Teja, who also has responsibilities to the Mech 2 program and graduate student admissions in the Department of Mechanical Engineering. Her background is in the area of mining.

2.5 Expected Sustainability

WWEST has fostered its Partners and Council networks into relatively mature states, facilitating connections among most of the university women in engineering programs in the region. Moreover, WWEST continues to deliver training and networking opportunities in order to develop capacity within individual partner organizations for continuous growth and collaborative planning. For our next Creating Connections, scheduled for May 2013, a number of WWEST Partners have been engaged to participate in core conference planning processes, including registration, programming, and marketing. We expect that the 2015 conference will be led other groups.

By using CSL curriculum development as a tool to encourage recruitment we have ensured that these efforts will be part of the mainstream engineering program at UBC for years to come. Our Self-Efficacy Study, Health and Well-being in the Workplace project and Faculty Working Climate study will be completed and results disseminated before the completion of the chair as will the CWSE Network’s Career Transition Survey. The Institutional Indicators Project, the Partnership Development Grant and our industry retention initiatives have been undertaken with long term partners including the other NSERC CWSEs, WinSETT, APEGBC, Engineers Canada and social science researchers such that the activities and outcomes of our work will be sustained beyond the term of the Chair.

2.6 Research

Dr. Croft runs an innovative research program in human-robot interaction with a focus on industrial and assistive robotics applications. As Director of the Collaborative Advanced Robotics and Intelligent Systems (CARIS) lab, Dr. Croft oversees an interdisciplinary, international research group and is primary supervisor for one postdoctoral fellow, one research engineer, 3 PhD candidates, and 5 MASc candidates and co-supervisor for a further two Ph.D. candidates and two Masters students also working
in the CARIS lab. In the past year, Dr. Croft has published 14 articles and 4 abstracts on her research in Human Robot Interaction in peer reviewed international journals and conferences, with a further 5 articles currently in the review process. Her research program is funded by General Motors, Hyundai Heavy Industries, CFI and NSERC and attracts approximately $400,000 of research funding per year (excluding graduate student scholarships and CWSE program funding and industry donations).

Dr. Croft continues to participate actively in a number of roles within the Department of Mechanical Engineering, the Faculty of Applied Science, and The University of British Columbia at-large. As mentioned in Section 2.1.4, Dr. Croft is co-PI on the Working Climate study for Science and Applied Science at UBC and Chair of the Applied Science Working Climate and Equity Committee. Moreover, Dr. Croft sits on the Search Committee for the Dean of Applied Science, the Community Service Learning and Women in Engineering advisory committees and the Faculty Association Status of Women Committee.

2.7 Obstacles

No major obstacles have been encountered during the first part of the program. WWEST has been very successful in rolling out our programs and our focus is now on successful implementation, dissemination and sustainability management for our current activities.

3 Proposed Action for the Remainder of the Term

3.1 Objectives

Our primary objectives for the remainder of the term are to complete the programs we have started, measure and document their impacts, and disseminate the information to the broader community, transitioning programs to organizations who have the ability to sustain them in the longer term. These projects are focused upon three areas: industry, post-secondary, and a regional community network.

In industry, WWEST will continue to mainstream the leadership development and management awareness workshops created by the WinSETT Centre, focusing on their adoption by APEGBC or another similar organization as part of a professional development series. We are also continuing our research with Professor Toni Schmader of the UBC Department of Psychology, analyzing stress in the SET work environment. Additionally, the SSHRC grant discussed in 2.1.7 will be pursued, and the self-efficacy studies described in 2.1.3 will be completed.

At UBC, we will work to move our CSL courses and course components into the mainstream curriculum, introducing context and community relationships into coursework for a broader student base, increasing the extent to which they are being exposed and increasing the visibility of these programs. With regards to climate, Dr. Croft will also continue to serve as a leader in developing academe climate best practices at both UBC and other institutions in partnership with the other Chairs as indicated in 2.1.4 and 2.1.7. WWEST will also work with Engineers Canada on a 30 x 30 strategy, partnering with APEGBC and APEGY (Yukon) on local initiatives. We will also support the UBC Faculty of Applied Science in reaching their target to double the recruitment of women into engineering.

The WWEST Council and WWEST Partners program have greatly enhanced the community networks in BC and Yukon, networks that will continue to be developed and whose members will be encouraged to collaborate and build links that will continue beyond the Chair. The Creating Connections conferences are being transitioned to function independently, with rotating hosts and support from other groups. In 2015, for instance, Simon Fraser University will host the conference. These conferences are a natural gathering point for organizations involved with women in SET, and the bi-annual events will continue to ensure ties and connections are refreshed and renewed on a regular basis.
3.2 Expected Impact

The overall impact of the WWEST program is to build a well-connected, resilient, and independent network of supporters of women in SET, and to ensure that new initiatives, when proven effective, are mainstreamed into schools, industry, and the community. By mainstreaming the WinSETT workshops as continuing professional development programs through APEGBC, we ensure that these experiences will continue to be available to young female professionals. Success in mainstreaming can be measured by whether or not at least one workshop is offered per year after the conclusion of the Chair.

We will demonstrate and report the positive change in self-efficacy found through the studies in 2.1.3, and disseminate them widely in industry. The impact of this will be measured by the number of organizations who adopt the tested interventions.

CSL helps students understand their education in context and connects curriculum to wider social consequences. The impact can be measured by the percentage of Mechanical Engineering students who participate in at least two CSL activities, and the percentage of students in engineering at-large who have the opportunity to choose to participate in CSL.

The impact of the WWEST Partners program will be measured through the number of new partnerships and programs created.

Within academic institutions, the impact of the climate studies can be measured through the adoption of new policies at UBC and changes in faculty experiences. In addition, WWEST will impact student registration by working with regional engineering schools to adopt set targets and dedicate resources to increasing the number of females recruited.

3.3 Team Members

The WWEST team composition described in 2.4 is expected to remain stable throughout the remainder of the term with regards to positions. By emphasizing undergraduate student participation in our team and exposing them to our activities and research, we are creating leaders for diversity within UBC, within their future graduate schools (where applicable) and their future employers. Postdoctoral Fellow Amir Haddadi will continue to support Dr. Croft’s research program as well as outreach activities, as described in 2.4.

3.4 Timeline

The following Gantt chart lists our main projects and gives a timeline for completion within the chair mandate. Partnered projects will be sustained by others beyond the mandate of the chair. Lighter shading indicates transition time where the Chair will be in a supportive or caretaking/monitoring role.

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APPENDIX 4:

SECOND 24 MONTH REPORT
NSERC Chair for Women in Science & Engineering, BC and Yukon Region

SECOND 24-MONTH PROGRESS REPORT

(Months 24-48)

September 5, 2014

Chairholder Information:
Dr. Elizabeth Croft, Ph.D., P.Eng., FEC, FASME
NSERC Chair for Women in Science and Engineering (BC & Yukon Region)
Associate Dean, Education and Professional Development
UBC Faculty of Applied Science
5000 – 2332 Main Mall
Vancouver, BC
Canada V6T 1Z4
Communities Impacted
September 2012 - August 2014

- Direct intervention
- WWEST Partners
- Community Representation

Base map from Brock University Map, Data & GIS Library

Population Density by Census Division
(persons/square kilometre)

- Less than 0.1
- 0.1 - 0.9
- 1.0 - 3.5
- 3.6 - 19.9
- 20.0 - 49.9
- 50.0 - 150.0
- Greater than 150.0

Adapted from Statistics Canada,
Population Dwelling Count Highlight Tables, 2006 Census, Catalogue number 97-550-XWE2000002

Metro Vancouver Impacts

reaching out

over

- 900 youth and parents
- 3100 post-secondary students
- 1100 industry professionals
- 850 academics
- 75 teachers
- 45 academe decision-makers

6000 direct interactions plus thousands more through WWEST Partners

* Note that Calgary, Alberta is the nearest and most easily accessed population centre for eastern BC.
Executive Summary

Over the past two years, the NSERC Chair for Women in Science and Engineering for the BC and Yukon Region (CWSE BC/Yukon), operating as WWEST (Westcoast Women in Engineering, Science, and Technology) has reached over six thousand people through direct interactions, and made an impact on thousands more by leveraging local, community-based leaders and non-profit organizations through the WWEST Partners program and community representatives. The majority of the proposed chair objectives have been achieved, and effort is now focused on sustaining these results and transferring them to other stakeholder groups for continuation beyond the Chair term.

An outstanding example of the impact the CWSE (BC/Yukon) over the past four years is illustrated through the percentage of women entering first year engineering at UBC Vancouver. When the Chair began in 2010, 19.7% of the first year class was women. This fall, 29.0% of the class will be women—a gain of almost 50%.

Chairholder Elizabeth Croft and the WWEST Program are recognized region-wide as champions for, and experts on, the full inclusion of women in science, technology, engineering and math fields. Dr. Croft was recognized as a 2013 YWCA Women of Distinction, was featured in the media thirty-two times over the past two years, and has been invited to give talks at eleven different events, including serving as the closing keynote speaker at the International STEM Conference 2014. She was named Associate Dean, Education and Professional Development, for the UBC Faculty of Applied Science in November 2014, and was recently appointed Chair of the Task Force on Engineering Culture formed by the National Council of Deans of Engineering and Applied Science.

WWEST hosted the Creating Connections 2013 Regional Conference, attracting 300 women and men from throughout the region. The conference achieved both of its major objectives: participants in the conference showed an immediate, statistically significant positive increase in their awareness of the value of gender diversity (P<<0.001), which was sustained at a six month interval (P<0.05). Participants also showed an immediate, statistically significant positive increase in their occupational self-efficacy (P<<0.001), a construct that predicts career persistence.

A key communication project of the past twenty-four months has been WWEST’s Gender Diversity 101 infographic fact sheets. Each sheet addresses one topic that is frequently discussed, and provides fully-cited, credible information and statistics addressing common questions or misconceptions about gender diversity. The infographics were released to strong reception, and co-branding and/or distribution agreements are in place with six non-profit, professional, and educational groups, ensuring the information is shared as widely as possible.

Engineering workplace best practices were identified as another area of particular concern. Dr. Croft (Principal Investigator) and interdisciplinary colleagues across Canada were awarded a Partnership Development Grant from the Social Sciences and Humanities Research Council of Canada for Engendering Engineering Success, which aims to identify which organizational practices best predict an inclusive and supportive workplace culture that maximizes organizational commitment and productivity. The total value of the grant and associated industry contributions is $305,432.

In academe, Dr. Croft was the Chair of the UBC Faculty of Applied Science (Vancouver Campus) Climate Committee, charged with identifying potential gaps and best practices to advance equity, diversity, and working climate. The findings identified a gender-based time-to-promotion delay, among other concerns. Dr. Croft continues to work with senior administration to implement the report recommendations.

Recognizing the outcomes and impact of the CWSE (BC/Yukon), Goldcorp donated $500,000 to UBC in 2014, creating the Goldcorp Professorship for Women in Engineering at UBC. The Professorship will sustain three of the large-scale outreach events currently supported by WWEST, in addition to several other initiatives, ensuring continuity beyond the end of the Chair.
1 Progress to Date

Over the past two years, the NSERC Chair for Women in Science and Engineering for the BC and Yukon region has expanded its impact throughout the region, across sectors, and across age groups. The majority of the proposed chair objectives have been achieved and effort is now focused on sustaining these results. Participation of women, particularly in engineering, shows significant growth, and collaborative efforts, catalyzed by the chair, have strengthened the overall capacity of the many regional groups working towards gender diversity in STEM. The profile of the Chair at UBC, and also at a national and regional level, has been raised as Dr. Croft has taken up the role as Associate Dean, Education and Professional Development within the Faculty of Applied Science at UBC, effective November 2013.

The following abbreviations and terms are used in this document:
- APEGBC: Association of Professional Engineers and Geoscientists of British Columbia
- CWSE: Chair for Women in Science and Engineering
- CWSE Program: The NSERC program that sets out the objectives and priorities for the CWSEs
- CWSE (BC/Yukon): Dr. Elizabeth Croft’s NSERC Chair for Women in Science and Engineering for the BC and Yukon regions
- DAWEG: Division for the Advancement of Women in Engineering and Geoscience, a division of APEGBC
- SFU: Simon Fraser University
- STEM: science, technology, engineering and mathematics
- UBC: University of British Columbia
- UVic: University of Victoria
- WWEST: Westcoast Women in Engineering, Science, and Technology; the operating name for the CWSE (BC/Yukon)
- WWEST Partners: A cornerstone program of WWEST that supports (financial, training, resources) locally-relevant non-profit organizations that recruit, retain, or develop women in STEM.

1.1 Objectives, Activities, Impacts, Collaboration, and Sustainability

The original proposal for the NSERC Chair for Women in Science and Engineering for the BC and Yukon regions outlined three objectives: awareness and outreach, recruitment, and retention and industry support. Each objective plays an important role in supporting the pipeline bringing women into science and engineering professions, and significant contributions have been made in each area over the past two years.

1.1.1 Awareness and Outreach

The CWSE (BC/Yukon) awareness and outreach objective focused on improving the capacity for awareness and outreach activities throughout the region, primarily through collaborations and creating a network. Additional awareness and outreach objectives are set through CWSE program, including developing, implementing, and communicating strategies to raise the level of participation, and providing accomplished female role models.

1.1.1.1 Creating Capacity for Ongoing Change

Investing in existing regional resources, and creating the conditions that make new resources possible, ensures WWEST’s contributions will have a sustained impact beyond the end of the NSERC CWSE (BC/Yukon).

Activity: Creating the Goldcorp Professorship for Women in Engineering at UBC

Impact: Recognizing the strong impact that Dr. Croft’s efforts through WWEST has made on gender diversity in STEM in BC/Yukon, particularly around supporting women in engineering,
Goldcorp has donated $500,000 to UBC to ensure outreach efforts to bring more young women into STEM continue beyond the Chair. Although the Professorship is based at UBC and will be running the first year pilots out of the UBC Vancouver campus, the Professorship is committed to collaborating with other institutions to run identical concurrent sessions throughout BC in 2015/16 and beyond.

**Collaborators:** Goldcorp, UBC Engineering, Dr. Sheryl Staub-French (Professorship holder). Discussions for cooperation begun with Dr. Yvonne Coady (UVic), Dr. Lesley Shannon (SFU), Renee Leboe (UBC Okanagan).

**Sustainability:** This Professorship will actively sustain three of the large-scale outreach events currently supported by WWEST, and extend the initiatives to new audiences.

**Activity:** Creating Connections Regional Conference

**Impact:** Creating Connections 2013 brought together 300 women and men from throughout the region (including Metro Vancouver, Vancouver Island, Vancouver Coast and Mountains, Thompson Okanagan, and the Yukon; travel subsidies were available). The objectives for the conference were to increase awareness of the benefits of gender diversity in STEM, and to encourage women in STEM to persist in their career paths. Conference highlights included Dr. Roberta Bondar, the first Canadian woman astronaut; Dr. Amiee Chan, CEO of Norsat; Anna Tudela (VP at Goldcorp); and a media panel including Carin Bondar (Discovery network), Bob McDonald (CBC Radio One Quirks and Quarks), Cam Cronin (H.R. MacMillan Space Centre) and moderated by Dr. Jennifer Gardy (Daily Planet).

As shown on the boxplots below, two validated psychometric instruments were used to assess the change in participants’ awareness of the benefits of gender diversity and their change in occupational self-efficacy (a proxy outcome to predict career persistence).

![Boxplots showing changes in self-efficacy and awareness scores](image)

Participants in Creating Connections 2013 showed an immediate, statistically significant positive increase in their awareness of the benefits of gender diversity (P<<0.001), an immediate, statistically significant positive increase in their occupational self-efficacy (P<<0.001). The awareness effects were sustained at a six month interval (P<0.05).

**Collaborators:** The Creating Connections planning team included representatives from UBC, SFU, UVic, DAWEG, Women in Engineering Vancouver Region (an industry group), the Mining Industry Human Resources Council, and the private sector. Broad support for the conference was demonstrated through donations totaling $57,000, contributed by: Hatch, Vivien M. Srivastava Memorial Endowment Fund, Seastar Solutions, Goldcorp, Genome British Columbia, APEGBC, TRIUMF, the Langley Concrete Group, the Applied Science Technologists and Technicians of British Columbia, SFU Faculty of Applied Sciences, UBC Okanagan School of Engineering, UBC Vancouver: Faculty of Applied Science, Faculty of Science, Alumni Office, Institute of Computing, Information and Cognitive Systems,
**WWEST Partners 2012-2014**

**Outreach Partners**
- Girls Exploring Physics (SFU)
- GIRLsmarts (Computer Science outreach, UBC, Vancouver)
- GEEring Up! UBC Engineering Science for Kids
  - Metro Vancouver
  - Northern BC
  - Okanagan
  - Vancouver Island
- Science Adventures (Yukon)

**Post-Secondary Partners**
- Women in Science and Engineering (UBC Okanagan)
- Women in Engineering (UBC Vancouver)
- Women in Science and Engineering (UBC Vancouver)
- Leadership Through Diversity (UVic)
- Women in Engineering Group and Women in Computing Science (SFU)
- Association of BC Women in Engineering (southern BC inter-university network)

**Industry Partners**
- Women in Engineering, Vancouver Region
- Society for Canadian Women in Science and Technology

**Conferences**
- Women in Physics Canada Conference
- Canadian Undergraduate Math Conference Women in Mathematics Dinner
- Symposium for Women Entering Ecology and Evolution Today
- Pacific Institute for the Mathematical Sciences Young Researchers Conference
- National Conference on Women in Engineering (Canadian Federation of Engineering Students)

Departments of Mechanical Engineering, Chemical and Biological Engineering, Physics and Astronomy, and Statistics.

**Sustainability:** The 2013 conference included considerable effort into ensuring that the Creating Connections event was perceived as a regional event, not tied to a single organization or person. The sense of collective ownership is visible in the very large number of collaborators and sponsors. The sustainability of this conference – and the impact it makes in our region – is very high: Creating Connections 2015 will be hosted by Simon Fraser University. SFU’s commitment to the conference objectives is illustrated by the $20,000 they have already committed to the event.

**Activity:** WWEST Partners Program

**Impact:** The WWEST Partners Program brings together new and existing not-for-profit organizations from throughout the region that have a focus on promoting women in STEM. Beyond a funding program, WWEST Partners are expected to collaborate and share best practices, and adds additional value through face-to-face networking opportunities for non-profit leaders and targeted training, including event management and measuring efficacy. WWEST Partners programs target all levels of outreach, and all areas of the region, providing broader, sustained, and community-based impact (see impact map).

In addition to the outstanding impacts individual partners have produced (example report in Appendix 1; full reporting will be available on www.wwest.ca as projects complete), we have seen region-wide benefits. Partners who were previously separated by geographic constraints are now sharing resources and mentoring each other in program development, allowing new programs to flourish much more quickly. Groups that previously had relatively small regular audiences are working together to co-present events, broadening their impact. Recently, two WWEST Partners that typically reached less than twenty participants each partnered with a group which had not previously offered women in STEM programming, selling out an evening talk with one hundred participants.

**Sustainability:** The WWEST Partners program was designed as a sustainable funding model. Funding structure was based on the needs of the group, but most partners signed multi-year funding agreements, providing a reliable base of support on which to grow, with values that diminished over time, forcing partners to pursue other sources of funding before the WWEST Partners agreement was complete.

The WWEST Partners model has been recognized by non-profits and by local industry as being an effective way of encouraging grassroots engagement. In recognition of this, the program will continue under the UBC Engineering Eng-Cite program, ideally in cooperation with the next Chairholder.

**1.1.1.2 Serving as a Role Model and Regional Champion**

As the CWSE (BC/Yukon), Dr. Croft has made a substantial impact on regional and national awareness as both a role model and a champion.
This was evident in the citation read as she was announced as the 2013 YWCA Women of Distinction (Education, Training and Development): “For more than 18 years, Elizabeth has been at the forefront of the campaign to increase the number of women engineering graduates. A dedicated engineer and professor of mechanical engineering at UBC, she is a passionate advocate for increased participation and retention of women in the engineering profession... and has also worked on national initiatives to help ensure that closing the gender gap becomes a national priority at universities across Canada.” (YWCA Metro Vancouver)

**Activity:** Providing hands-on research tours to youth

**Impact:** Over the past twenty-four months, Dr. Croft has personally provided hands-on research tour and robotics information sessions for over 500 young women.

**Collaborators:** GEERing Up! UBC Engineering & Science for Kids (an Actua organization), the Canadian Association of Girls in Science, UBC Institute of Aboriginal Health Summer Science program, UBC Engineering.

**Sustainability:** In addition to the personal participation of Dr. Croft, every tour included grad student and other faculty mentors, building connections between the partnering organizations and a broader set of available mentors.

**Activity:** Media appearances

**Impact:** Dr. Croft has had an exceptionally high level of media engagement over the past twenty-four months, with thirty-two appearances - from national publications to local profiles - highlighting both her research and her work to advance women in STEM fields. Highlights include five appearances in *The Globe and Mail*, and research features in *The Economist* and in *The New York Times Magazine*. A complete list of appearances is available in Appendix 2.

**Activity:** Invited talks

**Impact:** Over the past twenty four months, Dr. Croft has given eleven invited talks, ranging from speaking to youth at the HR MacMillan Space Centre, to addressing the Aviation Leadership Forum, a regional industry leadership organization, to serving as the closing keynote speaker at the International STEM Conference 2014. These invited talks directly illustrate Dr. Croft’s position as a regional champion with national presence. A complete list of talks is available in Appendix 3.

### 1.1.1.3 Building Regional Role Models

Every activity WWEST undertakes includes identifying and building regional role models as a key objective. Local women in STEM from all experience levels are invited to share their experiences, from high school robotics students acting as mentors at an event at HR MacMillan Space Centre, to university students running activities for high school students, to professionals mentoring university students, speaking at conferences, or working with their peers.

The WWEST Partners program, as previously discussed, also serves as a way to identify and support regional role models and leaders.

“The WWEST program has had a significant impact on my professional life by helping me to connect with a community of female academics and industry professionals, by providing me with opportunities to develop my leadership skills, and by facilitating the creation of the Goldcorp Professorship in Women in Engineering that I am honored and excited to hold.”

- Dr. Sheryl Staub-French
  Associate Professor, UBC
In addition, WWEST has successfully nominated six outstanding women for prestigious awards over the last twenty four months, including a Vanier Canada Graduate Scholarship, the Engineers Canada Award for the Support of Women in Engineering, and two Canadian Engineering Memorial Foundation scholarships.

An excellent example of the development of regional role models is Dr. Sheryl Staub-French, an Associate Professor at UBC. Dr. Staub-French had expressed interest in increasing her involvement with women in STEM activities, and began to regularly participate in WWEST activities as a volunteer. This later developed into a position as a WWEST Faculty Associate, before being named the inaugural Goldcorp Professor for Women in Engineering at UBC. In the past twelve months, Sheryl has been featured in three media articles, including in the Vancouver Sun, and been invited to speak at four separate events.

1.1.1.4 Creating Comprehensive Communication Strategies

**Activity:** Social Media

**Impact:** When WWEST began, the BC/Yukon region had a large number of unconnected and uncoordinated women in STEM organizations and a strong body of leaders. It was immediately clear that one pressing need was for organization, coordination, and cross-marketing. A social media strategy was developed that was centered around highlighting the activities already taking place in the region, in addition to WWEST’s own activities. Highlights from WWEST Partners and articles of interest were later added. Information is now pushed through 175 Facebook Likes (followers), 219 Twitter followers, a blog with RSS, and 313 subscribers to our semi-monthly digest. One of the most visible impacts this strategy has made is in event date coordination – it was previously not uncommon to have women in STEM events scheduled on the same day, but the increased visibility of events has prevented duplication.

**Collaborators:** WWEST Partners, other local non-profit organizations, post-secondary institutions, national non-profit organizations, other CWSEs.

**Sustainability:** WWEST has begun discussions to have the social media activities adopted by another organization after the end of the CWSE (BC/Yukon) term.

**Activity:** Infographic Fact Sheets: Gender Diversity 101

**Impact:** When interacting with business leaders and professionals, it was evident that clear, concise fact sheets backed up with full citations would lend much more credibility to our efforts. Seven topics have been created to date: Unconscious Bias, Mentoring Works, Stereotype Threat, The Business Case for Gender Diversity, Gendered Language Stereotype Awareness for Hiring Committees, Understanding Workplace Diversity, and What is Engineering? The infographics were released to strong reception, and we have excellent feedback from industry, regulatory organizations, and non-profits. A co-branding initiative was started to provide organizations with a vested interest in sharing the infographic content. Based on the success of the project, we are now reworking the print materials to a Pinterest-friendly format to access new audiences.

**Collaborators:** Confirmed co-branding partners include: UBC Engineering, the Engineering Leadership Council (professional group), APEGBC (limited topics), Society for Canadian Women in Science and Technology, and the Ontario Network of Women in Engineering. A distribution agreement, without co-branding, has also been set with the Mining Industry Human Resources Council.

**Sustainability:** Co-branding agreements are in perpetuity – partners have the ability to continue to distribute, print, use, and promote the fact sheets after the end of the CWSE (BC/Yukon).
1.1.2 Recruitment

The CWSE (BC/Yukon) recruitment objective focused on publically promoting the range of opportunities in STEM careers, the collaborative nature of the professions, and the ability for STEM professionals to create positive change in local and global communities. It aligns with the overall NSERC CWSE objectives to encourage young women to consider STEM careers and to increase the enrolment of women in STEM programs at universities, and to eliminate existing barriers.

Combining recruitment efforts with climate improvements have yielded a strong upward trend in the percentage of women entering UBC Engineering first year, as shown below.

![Graph showing percentage of women in UBC Engineering first year students, 2008-2014](image)

1.1.2.1 Direct Outreach

**Activity:** Youth Outreach Events

**Impact:** In addition to the broad outreach undertaken through the WWEST Partners program, WWEST was directly involved in two signature events for young women in high school. Steveston-London Secondary School Introduce a Girl to Engineering Day (for Grade 8) was run in conjunction with School District 38, consisting of a keynote speech and three hands-on, engineering student- and alumni-led activities that exposed a broad range of engineering professions. One student comment forwarded to us from the teacher-organizer stated: “I learned what engineering is and my interest for it also grew 😊. All volunteers were very friendly and answered my general questions about universities.”

The second signature event, Engineering PowerUp!, was held at UBC Vancouver for grade 10 girls. On the post-evaluation, responding to a question about what engineers do, one participant wrote: “Engineers work in all areas, because engineers have their part to play in the world. Everything we do/have relates to engineering, from the cell phones we use, to the water bottles on our tables, to the equipment used in hospitals. Innovative, collaboration, teamwork, problem solving, communication, thinking outside the box.” She later commented that the day “…opened my eyes about engineering as a possible career.”

Sustainability: Both of these events have been incorporated into the work plan of the Goldcorp Professorship for Women in Engineering at UBC, and will be taken over after the CWSE (BC/Yukon) ends.

Activity: Post-Secondary Workshops

Impact: Bringing women into the STEM pipeline is only part of the challenge – the other half is keeping them there. WWEST was invited to provide workshops to current post-secondary students at the University of Victoria (Vancouver Island) and at the National Conference for Women in Engineering (run by the Canadian Federation of Engineering Students). Workshops were customized for each request, and focused on workplace diversity and leadership for students and junior employees, empowering participants to work together to find solutions to problems they identified. The National Conference for Women in Engineering consented to run the same survey set WWEST ran at the Creating Connections Event, and achieved similar results (NCWiE 2013 delegates had a statistically significant increase in occupational self-efficacy (a predictor of career persistence) and awareness of the benefits of gender diversity. Study conducted with WWEST; measures by Rigotti et al (2008) and Meng et al (2013)).

Collaborators: Leadership through Diversity, UVic, National Conference for Women in Engineering, UBC Engineering Undergraduate Society

Sustainability: WWEST will continue to accept workshop requests in the upcoming year. Outlines, slides, and other supporting documentation for all workshops have been shared in their entirety with the CWSE / CFSG Réseau National Network to allow for replication or modification beyond the end of the CWSE (BC/Yukon).

1.1.2.2 Highlighting a Climate of Inclusion and Supporting Change

Activity: Engineering Inclusion Initiative

Impact: The UBC Engineering Inclusion Initiative was launched in the spring of 2014, capitalizing on the culture changes started by WWEST and catalyzed by Dr. Croft and student leaders who have worked with WWEST. This project is making recommendations for and concrete changes to curriculum, faculty awareness, and student life to ensure an inclusive and supportive environment for all students. Plans are already in place (see 1.1.3.3) to share the resulting best practices with engineering schools across BC and Canada.

Collaborators: UBC Engineering, UBC Engineering Undergraduate Society, UBC Access and Diversity

Sustainability: This initiative is being championed by the Dean of Applied Science at UBC and is part of the strategic plan.

“WWEST has been an amazing resource and support system for me as a female student leader in UBC Engineering. When I was Chair of the National Conference on Women in Engineering 2013, WWEST gave me support with everything from operating resources to amazing mentorship and leadership from Jennifer Pelletier and Elizabeth Croft. As well, as a UBC Engineering student, WWEST has introduced to an amazing network of mentors and events that help improve my leadership and love for Engineering. In the past few years, the culture at UBC Engineering, especially within students, has changed to be more inclusive, welcoming and to have a stronger female presence. In my opinion, this change can largely be attributed to having this Chair at UBC. I will be sad to see this Chair come to an end, however, I know the programs they started and the culture shift they created will continue on for many years to come.”

- Veronica Knott
  UBC Vancouver Engineering Undergraduate Society President
**Activity:** Supporting student leader-initiated change

**Impact:** In addition to working with the Engineering Inclusion Initiative, the Engineering Undergraduate Society at UBC Vancouver specifically approached WWEST for assistance in evaluating their historical events and activities for diversity, inclusion, and other measures. Jennifer Pelletier assisted the students with rubric design and facilitated an evaluation and selection session at their Strategic Planning Meeting. This invitation from student society leaders strongly illustrates the relationships and trust WWEST has built, and the significant changes in climate that have resulted from the first four years of the CWSE (BC/Yukon).

**Collaborators:** UBC Vancouver Engineering Undergraduate Society, UBC Vancouver Engineering Departmental Clubs

**Sustainability:** The materials from this session, including the rubric, have become part of the Engineering Undergraduate Society President’s Transition Manual.

### 1.1.2.3 Change through Curriculum

**Activity:** Community-based experiential learning

**Impact:** A major focus of the first twenty four months of the CWSE (BC/Yukon) were three Community Service Learning pilot programs: (1) broad implementation in the UBC Mech 2 program, with short interventions for a large number of students, (2) a targeted upper-year elective course in Global Engineering Leadership featuring guest speakers and a local project, and (3) an international service learning placement with hands-on engineering experience. All three courses have been well-received, resulting in each one of them becoming a permanent part of the UBC Vancouver curriculum, ensuring that students have the opportunity to link their classroom knowledge to community concerns, increasing relevance and engagement. The Mech 2 implementation is now part of Mech 224, and must be completed to pass the course. The upper year courses now have permanent course numbers, and are elective options in most engineering programs.

**Collaborators:** UBC Engineering, UBC Community Based Experiential Learning, Tsomanotik (Chiapas, Mexico)

**Sustainability:** These pilots are now part of the curriculum, and are therefore unlikely to change. Best practices from these pilots have been shared at engineering education conferences.

**Activity:** UBC Vancouver First Year Engineering Curriculum Reform

**Impact:** Anecdotally, one often-cited reason for attrition in first year engineering at UBC Vancouver is the lack of immediate relevance of the content (mostly pure math and science) to engineering or helping the community. Championed by Dr. Croft and supported by the success of community-based experiential learning pilots in upper year classes, UBC Vancouver is re-evaluating the first year curriculum to focus on the integration of design, problem-solving, and social contexts – aspects of engineering that are particularly attractive to female students.

**Sustainability:** UBC Engineering has created the position of First Year Chair to champion the reform. This is a new, permanent administrative role for a faculty member.

### 1.1.3 Retention and Industry Support

The third CWSE (BC/Yukon) recruitment objective was to compile best practices for retaining women in SET careers. This aligns with NSERC CWSE objectives to eliminate barriers for women who wish to pursue careers in science and engineering, increase the retention rate of women in STEM.
1.1.3.1  Engendering Engineering Success – a SSHRC PDG Project

**Impact:** Engendering Engineering Success is a Partnership Development Grant, awarded by the Social Sciences and Humanities Research Council of Canada. It aims to identify which organizational practices best predict an inclusive and supportive workplace culture that maximizes organizational commitment and productivity for both men and women. Bringing together non-profits, academe from several disciplines, and industry, Engendering Engineering Success significantly extends our ability to analyze workplaces and communicate best practices to industry. The grant is worth $193,372, combined with industry support of $112,060, for a total of $305,432 in funding.

**Collaborators:** Dr. Croft is the Principal Investigator of the grant. Co-Principal Investigators are Dr. Michelle Inness, University of Alberta School of Business; Dr. Toni Schmader, University of British Columbia Department of Psychology and Canada Research Chair in Social Psychology; and Dr. Valerie Davidson, University of Guelph Professor Emerita School of Engineering. Our work is supported by: Engineers Canada, CWSE National Network, Canadian Centre for Women in Science, Engineering Trades and Technology, Mining Industry Human Resources Council, Enbridge Pipelines Inc., WorleyParsons Canada. Additional industry partners are corporate participants in the studies, but cannot be named.

**Sustainability:** This grant extends beyond the CWSE (BC/Yukon) and work will continue through it. There are plans to continue to a full Partnership Grant application.

1.1.3.2  Building Industrial Awareness of the Value of Gender Diversity and Encouraging Persistence for Women in the Pipeline

In addition to building awareness through the Creating Connections Conference and National Conference on Women in Engineering, as previously discussed, WWEST has also reached out to industry through a number of industry-focused workshops.

**Activity:** Industry Workshops

**Impact:** To maximize both exposure and access, WWEST has focused on delivering workshops in conjunction with or through existing industry group meetings and events. Four workshops were delivered over the past twenty-four months, focusing on building leadership diversity and mentoring.

**Collaborators:** APEGBC, Association of Professional Engineers and Geoscientists of Alberta.

**Sustainability:** Materials from these workshops are being archived and shared, per 1.1.2.1.

“WWEST has provided fantastic opportunities to meet women and network with other women in STEM careers in the lower mainland, providing mentorship opportunities that would likely have been otherwise impossible.”

- Dr. Lesley Shannon, Associate Professor, SFU

1.1.3.3  Creating Change Through Governance, Professional Associations, and University Leadership

Dr. Croft and WWEST have been recognized as experts in diversity and change creation through invitations to serve on senior committees and consultation requests. An outstanding example at the national level is the appointment of Dr. Croft as the Chair of the Task Force on Engineering Culture, formed by the National Council of Deans of Engineering and Applied Science. The task force will work with engineering students, the academic community, and the professional community to reshape and
refocus the culture of Canadian engineering programs and student societies to promote respectful behaviour, inclusivity and ethical conduct for engineering students.

At a grassroots level, Dr. Croft was also the Chair of the UBC Faculty of Applied Science (Vancouver Campus) Climate Committee. In 2012/2013, the Faculties of Applied Science and Science jointly assessed the working climate and status of equity and diversity for their faculty members in the Science and Engineering departments and affiliated major research centres. The overall goal of this study was to identify potential gaps and best practices to develop recommendations for the Faculties’ efforts to advance equity, diversity and working climate for faculty in alignment with UBC’s employment equity and respectful working environment goals. Six main findings were identified, including that “averaged over the current cohort and adjusted for leaves, women engineering faculty achieve tenure more than one half year later than men faculty. As well, on average women faculty remain in the associate professor rank prior to promotion over two years longer than men faculty.” Dr. Croft continues to work with senior administration to implement the recommendations of the report

Over the past twenty four months, Dr. Croft has also served on the Engineers Canada Women in Engineering Advisory Group, the UBC Dean of Applied Science Search Committee, and the APEGBC Council Subcommittee Task Force on Women in Engineering. Dr. Croft and WWEST were also asked to consult with APEGBC on career awareness outreach and mentoring, and with the Association of Canadian Chairs of Chemical Engineering on recruiting and retaining women students and faculty.

1.1.4 Academic Contributions
Gender diversity-related academic contributions by Dr. Croft and the WWEST team include:

- Major Tri-Council Grant (see 1.1.3.1): SSHRC PDG Engendering Engineering Success - $193,372
- Gender Summit – North America Conference, Washington DC: panelist and rapporteur
- CCWESTT 2014 Policy Forum Keynote: How Much Are You Worth?
- CCWESTT 2014 sessions:
  - Call to Action (Farenhorst, Croft, Franz-Odendaal, Mavriplis)
  - Designing Evaluations (Meng, Pelletier, Croft)
  - Engendering Engineering Success (Croft, Davidson, Inness, Schmader)
  - Starting Conversations: A National Conference on Women in Engineering (Knott, Dozzi, Li, Palmer, Meng, Pelletier)

1.2 Team Members
The CWSE (BC/Yukon) is supported by a team that includes staff, student staff, and researchers. Team members are listed in Appendix 4.

1.3 Research Activities of the Chairholder
Dr. Croft is Director of the Collaborative Advanced Robotics and Intelligent Systems (CARIS) lab at UBC. This. She is primary supervisor for one postdoctoral fellow, one research engineer, five Ph.D. candidates, and four MASc candidates and co-supervisor for a further two Ph.D. candidates and two
Masters students also working in the CARIS lab. In the two years, Dr. Croft has published 13 articles and 12 abstracts on her research in Human Robot Interaction in peer reviewed international journals and conferences. Her research program is funded by General Motors, Hyundai Heavy Industries, CFI and NSERC and attracts approximately $400,000 of research funding per year (excluding graduate student scholarships and CWSE program funding and industry donations). Her work has been featured in the New York Times, The Economist, The National Post, CBC, among others. She has been profiled as one of the “25 women in robotics you need to know about” on the International site “Robohub” and on the 2014 “Wiles Hot List”.

As NSERC Chair and PI of the SSHRC Partnership Development grant, Dr. Croft has expanded her research profile and published a number of articles related to the impact of interventions, particularly workshops and conferences for women in STEM, on self efficacy and gender awareness (see 1.1.4).

1.4 Obstacles

No major obstacles have been encountered. While the new role of Associate Dean does create a significant challenge in balancing all of the needed activities as a chair, researcher and academic, some important strategies have been put in place. Dr. Croft has been allotted full teaching relief to allow her to focus on her roles as Associate Dean and CWSE (BC/Yukon). Professor Sheryl Staub-French was appointed as, first, WWEST Faculty Associate and, now, Goldcorp Chair has allowed a team approach to handling the many outreach activities. Most importantly, the greater profile and administrative responsibility of the Chairholder has allowed many of the activities of the chair to be more easily moved into mainstream programs and projects.

One unique feature of the BC/Yukon region is that most of the area is sparsely populated – less than one person per square kilometer. Seventy three percent of the overall regional population is concentrated in Metro Vancouver and on Vancouver Island. Many professionals outside this area travel into Metro Vancouver for business on a regular basis. Accordingly, WWEST has found that the most effective way to reach our demographic is by hosting events in this area and providing free or subsidized travel for those in other parts of the region. In addition, we use the WWEST Partners program and community representatives to engage local champions and extend our programs in community-focused, locally-appropriate ways throughout the region.

2 Proposed Action for the Remainder of Term

2.1 Objectives and Expected Impacts

The main objective of the remaining year of the CWSE (BC/Yukon) is to successfully transition our established programs to other groups, as described under sustainability in each section. For most projects, transitions will begin in fall 2014 to ensure there is one year of support available for the new project leaders. WWEST is also committed to creating resource packages from the materials developed over the past forty eight months, and sharing them with the CWSE / CFSG Réseau National Network, WWEST Partners and other local organizations, and ideally the next CWSE (BC/Yukon) to ensure they remain useful and accessible beyond the end of the Chair.

Working with the CWSE / CFSG Réseau National Network and the UBC Provost Office, we will also be hosting an Academic Advancement workshop for Associate Professors, open to women faculty across Canada. The Engendering Engineering Success project will continue.

2.2 Team Members and Timeline

It is expected that the team structure will remain stable over the next twelve months. The Academic Advancement workshop is currently planned for May 2015, to coincide with the transitioned Creating Connections 2014. Transitions will be ongoing throughout the period, with some dependency on the announcement date for the next CWSE (BC/Yukon).
APPENDIX 5:

FINAL YEAR NEWSLETTER
Engineering Explorations
Four outreach events reaching students in Grades 8-10 and teachers of Grade 6/7.

“Very fun and learnt much more about engineering choices at uni. Loved how we had hands on things to do, not just listening”
- Engineering Explorations 9 Participant

Engineering in Your Classroom led grade 6 and 7 teachers through three curriculum-based engineering activities over the day-long conference, and offered an opportunity for teachers to discuss possible modifications to support implementing the activities in their classrooms. Each teacher who attended received a classroom kit of all the materials needed to run the activities. Feedback from the day included:

“It was the best pro-D I’ve been to. Fun, interesting, resources, food, interaction with professors and students. Awesome!”

“Thank you so much for this workshop - very informative and relevant. Good speakers, lovely lunch, excellent information. Will highly recommend if anyone else is interested.”

These four programs will continue through eng•cite and UBC Engineering.

Inaugural holder of the Goldcorp Professorship for Women in Engineering at UBC: Dr. Sheryl Staub-French, P.Eng.

The Mandate: Increase the number of women entering UBC Engineering to 50% by 2020.

Signature Events:
- Engineering Explorations 8, 9 & 10
- Engineering for Your Classroom (Gr. 6/7 Teachers)

In partnership with UBC Engineering & eng•cite, WWEST co-organized four outreach events between September 2014 and March 2015:

- Engineering Explorations 9, October 18, 2014 | 90 grade 9 students
- National partnership with the Ontario Network of Women in Engineering
- Engineering in Your Classroom, October 24, 2014 - 70 teachers
- Engineering Explorations 8, February 28, 2015 | 54 grade 8 students
- Steveston London Secondary School, Richmond
- Engineering Explorations 10, March 28, 2015 - 90 grade 9 students

Engineering Explorations participants went on lab tours, interacted with current engineering students and industry members, and tackled hands-on team design challenges during these full-day events.

“It was a very interesting experience for me as I got to see cool labs. I also got to meet people that work/study in the fields that I am interested in. This event gave me an idea of what my dream career looks like and what I need to do to pursue it.”
- Engineering Explorations 10 Participant

Our Work Continues
Through two exciting organizations

eng•cite
The Goldcorp Professorship for Women in Engineering at UBC
The University of British Columbia

Made possible by a $500,000 gift from Goldcorp, secured in part, by WWEST

Inaugural holder of the Goldcorp Professorship for Women in Engineering at UBC: Dr. Sheryl Staub-French, P.Eng.

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Learn more at engcite.ca

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- Engineering Explorations 10 Participant
Creating Connections 4.0

WWEST was proud to support Creating Connections 4.0 at Simon Fraser University in May 2015. The conference was expanded to two days with a Leadership and Diversity track on Friday, May 22, 2015 and the main conference on Saturday, May 23, 2015.

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Jennifer Pelletier (Manager)
Rebekah Parker (Education & Outreach Coordinator)
Rubin Chiu (Social Media Coordinator)
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This ceremony will become an annual tradition, to welcome all incoming students into the UBC Engineering community with a pin marked by their entrance year. In 2014 Iron Pins were distributed to current students, staff, and alumni.

Below: representatives from the UBC Faculty of Applied Science, APEGBC and the EUS.

Quantum Leaps
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The event evaluation was administered as a pre- and post- test. A total of 16 responses were collected, 10 of which were complete, out of 16 participants, a response rate of 88%.

As shown below, the full workshop resulted in statistically significant (p<0.01) positive changes for participants’ occupational self-efficacy (indicating career persistence).

From June 1-2, 2015, WWEST presented a Women in STEM workshop series, co-hosted with:

•    Government of Yukon Executive Council Office
•    Government of Yukon Staff Development Branch

Dr. Elizabeth Croft, Dr. Lesley Shannon and Jennifer Pelletier presented 4 workshops on mentorship leadership, and effective measurement. Local STEM mentors shared their experiences and perspectives with the participants, and the workshop series culminated in a mix-and-mingle event.

Promotion to Professor Workshop
Promotion to Professor was a national, three day event which brought together 16 women Associate Professors in science and engineering who are working towards promotion to the rank of Professor.

Participants were invited to an evening reception on May 19th, 2015 to network with each other, senior peers, and UBC administrators. On May 20th, the full day workshop included sessions and panels from 10 senior academics and administrators from UBC, Harvey Mudd College, and the University of Guelph, reflection activities, and group discussions. Topics included:

•    Researching and Understanding the Criteria for Full Professorship
•    Managing your Research Reputation and Getting Recognition
•    Work-Life Effectiveness
•    How to Deal with Politics
•    Service, Administrative Duties and Teaching
•    Creating a Plan: The Package, the Letter and Timing

The Self-Efficacy Survey is scored out of 24 points.
Pre-event average: 21.8
Average increase: +3.27
Statistically significant? Yes, p<0.01

Participants met with CV mentors (senior UBC academics) on May 21st for thirty to forty-five minutes. As shown below, the full workshop resulted in statistically significant (p<0.01) positive changes for participant’s occupational self-efficacy (indicating career persistence).

How to read a box and whisker plot:
- The quartiles of the scores are represented by the area above the box, the top half of the box, and the area below the box.
- The box illustrates the experience of half of the respondents, while the whiskers show the extremes.
- The movement of the line shows the change in the median score.
- The movement of the red dot shows the change in the average score.

Post-event Survey Responses
On a Likert Scale of 1-5, 1 = strongly disagree, 3 = neutral, 5 = strongly agree

- I know what my next steps are to applying for full professorship. 4.3
- I feel more confident about applying for full professorship after this workshop. 4.4
- I know how to access resources to support me in my application for full professorship after this workshop. 4.1

"Thank you for a very valuable experience. I learned much and feel that this workshop will make a real difference for me."

The WWEST evaluation was administered as a pre- and post- test. A total of 18 responses were collected, 10 of which were complete, out of 16 participants, a response rate of 88%.
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WWEST Chairholder

Dr. Elizabeth Croft

WWEST Faculty Associate

Dr. Sheryl Staab-French

Staff Members

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Student Assistants:

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Our Work Continues
Through two exciting organizations

eng•cite
The Goldberg Professorship for Women in Engineering at the University of British Columbia
Made possible by a $500,000 gift from Goldcorp, secured in part, by WWEST
Inaugural holder of the Goldberg Professorship for Women in Engineering at UBC: Dr. Sheryl Staub-French, P.Eng.

The Mandate:
Increase the number of women entering UBC Engineering to 30% by 2020.

Signature Events:
Engineering Explorations 8, 9 & 10
Engineering for Your Classroom (Gr. 6/7 Teachers)

Learn more at: engcite.ca

In partnership with UBC Engineering & eng•cite, WWEST co-organized four outreach events between September 2014 and March 2015:

- Engineering Explorations 9, October 18, 2014 | 90 grade 9 students
National partnership with the Ontario Network of Women in Engineering
- Engineering in Your Classroom, October 24, 2014 | 70 teachers
- Engineering Explorations 8, February 28, 2015 | 54 grade 8 students
Steveston London Secondary School, Richmond
- Engineering Explorations 10, March 28, 2015 | 90 grade 9 students

Engineering Explorations participants went on lab tours, interacted with current engineering students and industry members, and tackled hands-on team design challenges during these full-day events.

“It was a very interesting experience for me as I got to see cool labs. I also got to meet people that work/study in the fields that I am interested in. This event gave me an idea of what my dream career looks like and what I need to do to pursue it.”

- Engineering Explorations 10 Participant

Engineering in Your Classroom led grade 6 and 7 teachers through three curriculum-based engineering activities over the day-long conference, and offered an opportunity for teachers to discuss possible modifications to support implementing the activities in their classrooms. Each teacher who attended received a classroom kit of all the materials needed to run the activities.

Feedback from the day included:

- “It was the best pro-D I’ve been to. Fun, interesting, resources, food, interaction with professors and students. Awesome!”
- “Thank you so much for this workshop - very informative and relevant. Good speakers, lovely lunch, excellent information. Will highly recommend if anyone else is interested.”

These four programs will continue through eng•cite and UBC Engineering.

Dr. Lesley Shannon is the NSERC Chair for Women in Science & Engineering BC/Yukon from May 2015-April 2020.
She will be continuing to use the WWEST name.
For more information, contact wwest@sfu.ca

Four generations of the NSERC CWSE BC/Yukon (L to R):
Drs. Lesley Shannon, Elizabeth Croft, Anne Condon, & Maria Klawe

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Westcoast Women in Engineering, Science & Technology

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JOURNAL PUBLICATIONS


CONFERENCE PROCEEDINGS


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OTHER EXTERNAL PUBLICATIONS


A digital binder of these articles can be retrieved from [www.wwest.mech.ubc.ca/report](http://www.wwest.mech.ubc.ca/report).

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<tr>
<td>2014/11/12</td>
<td>UBC.ca</td>
<td>UBC engineers to host 14 Not Forgotten</td>
</tr>
<tr>
<td>2014/11/25</td>
<td>UBC.ca</td>
<td>Iron Pin ceremony marks commitment to professionalism from the start</td>
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<tr>
<td>2014/12/04</td>
<td>UBC.ca</td>
<td>New plaque at UBC commemorates Ecole Polytechnique tragedy</td>
</tr>
<tr>
<td>2014/12/14</td>
<td>What’s Your Tech</td>
<td>Women in Tech make Top 100 Most Powerful Women List</td>
</tr>
<tr>
<td>2015/01/03</td>
<td>The Huffington Post</td>
<td>Canadian universities attracting kids, especially girls, to sciences</td>
</tr>
<tr>
<td>2015/02/20</td>
<td>UBC.ca</td>
<td>UBC engineering enrolls record number of women in 2014</td>
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<tr>
<td>2015/02/23</td>
<td>B.C. Business.ca</td>
<td>Women want in</td>
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<tr>
<td>2015/04/23</td>
<td>SCWIST.ca</td>
<td>SCWIST invited to House of Commons in Ottawa</td>
</tr>
<tr>
<td>2015/05/08</td>
<td>Burnaby Now</td>
<td>Class Act: inaugural girls’ science conference a success</td>
</tr>
<tr>
<td>2015/05/15</td>
<td>Yukoncollege.ca</td>
<td>Sci-Tech Girl event aims to encourage more female scientists</td>
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</table>
APPENDIX 8:

AWARDS
**AWARDS WON BY WWEST 2010-2015**

**DR. ELIZABETH CROFT**

WXN Top 100 Most Powerful Women in Canada, 2014

YWCA Vancouver Women of Distinction, Education, Training and Development Award, 2013

YWCA Vancouver Women of Distinction, Education, Training and Development Award, 2012 (Nominated)

Featured Faculty member, UBC Board of Governors Meeting, February 2015

AMS Just Desserts Award, 2015

**DR. SHERYL STAUB-FRENCH**

Distinguished Engineering Alumni Award, School of Engineering, Santa Clara University, 2015

**JENNIFER PELLETIER**

President’s Staff Award, UBC 2010

Dean’s Award for Excellence in Service, UBC Faculty of Applied Science, 2012

AMS Just Desserts Award, 2015

**AWARDS WWEST HAS NOMINATED PEOPLE FOR**

Ajung Moon, Vanier Canada Graduate Scholarship (Government of Canada), 2013

Alexandra Dozzi, APEGBC MAPS Award, 2015

Andrea Palmer, Canadian Engineering Memorial Foundation Undergraduate Award, 2013

Andrea Palmer, CEMF Dillon Scholarship, 2014

Annelies Tjebbes, UBC Engineering Excellence Awards, Outstanding Future Alumnus, 2012

Bernadette Currie, APEGBC DC Lambert Award Professional Service Award, 2013

Catherine Mavriplis, Elsie MacGill Northern Lights Award, 2014 (decision pending)

Catherine Roome, Engineers Canada Award for the Support of Women in Engineering Profession, 2012

Catherine Roome, APEGBC McLachlan Memorial Award, 2011

Catherine Roome, YWCA Vancouver Women of Distinction Award, 2012 (nominated)

Connor Schellenberg-Beaver, UBC Wesbrook Scholar Award, 2013

Margaret Li, APEGBC DC Lambert Professional Service Award, 2012

Robin Farnworth, UBC Engineering Young Alumnus Award, 2011
APPENDIX 9:

WORKSHOPS
Links to workshop and presentation slides can be found at: www.wwest.mech.ubc.ca/report.

WORKSHOPS & PRESENTATIONS BY WWEST

ON SUPPORTING WOMEN IN ENGINEERING, SCIENCE AND TECHNOLOGY

- February 1, 2011 - Langara College, BC, WWEST and Careers in Engineering, Dr. Elizabeth Croft.
- February 28, 2011 - University of Victoria, ON, Supporting Women in Engineering, Science and Technology in BC/Yukon, Dr. Elizabeth Croft.
- April 5, 2011 - University of Okanagan, BC, Supporting Women in Engineering, Science and Technology in BC/Yukon, Dr. Elizabeth Croft.
- June 4, 2011 - Northwest Biomechanics Symposium Workshop, Women in Biomechanics, Dr. Elizabeth Croft, Jennifer Pelletier.
- December 8, 2011 – Goldcorp, Vancouver BC, Women in Engineering Forum Panelist, Dr. Elizabeth Croft.
- February 8, 2012 - BCIT, WWEST Basics, Dr. Elizabeth Croft.
- June 18, 2013 - Canadian Engineering Education Association Conference, Montreal, QC, Design for Inclusion, Dr. Elizabeth Croft, Dr. Catherine Mavriplis.
- November 4, 2011 - Science World, Vancouver BC, Happy 30th Birthday SCWIST, Dr. Elizabeth Croft Keynote

ON BENEFITS OF DIVERSITY IN THE WORKPLACE

- October 25, 2010 - APEGBC AGM Conference, Victoria BC, Benefits of Diversity in Your Organization, Dr. Elizabeth Croft, Jennifer Pelletier.
- April 19, 2011 - Worley Parsons Strategy Session, Vancouver, BC, Engendering Change, Dr. Elizabeth Croft.
- July 29, 2011 - PACE Conference, UBC Vancouver, Why should we care about women in engineering anyway? Jennifer Pelletier, Dr. Elizabeth Croft.
- February 19, 2013 – Aviation Leadership Forum, Vancouver, BC, Keynote Speech, Dr. Elizabeth Croft.
- May 11, 2013 - Creating Connections 3.0, UBC Vancouver, Workshop: Diversity is great but how do we do it? Dr. Elizabeth Croft, Jennifer Pelletier.
- May 22, 2015 - Creating Connections 4.0, Simon Fraser University, BC, Strategic Recruiting – Values-Guided Hiring, Dr. Elizabeth Croft, Jennifer Pelletier.
THE NEXT GENERATION OF WOMEN IN STEM: MAKING TRANSFORMATIVE CHANGE

- July 15, 2014 - UBC Vancouver, International Conference of STEM in Education, Dr. Elizabeth Croft.
- June 1, 2015 – Women in STEM Workshop Series, Whitehorse, YT, Dr. Elizabeth Croft.

ON CAREER PATH

- April 12, 2012 - DAWEG and EWB event, Vancouver, BC, A Career with meaning: Engineering at the intersection of societal challenges and personal passion, Dr. Elizabeth Croft.
- November 1, 2012, Edmonton, AB, WISEST Lectureship Keynote Speech & Panel, Dr Elizabeth Croft.
- June 18, 2014 - West Vancouver Women’s Network, Why your daughter should consider engineering, Dr. Sheryl Staub-French.
- November 11, 2014 - Women in Society of Environmental Toxicology and Chemistry (SETAC) Luncheon, Women Leaders in Science – the Power to Influence, Dr. Sheryl Staub-French.
- March 19, 2015 - BCIT, Burnaby, My Engineering Experience – Travelling with Friends, Dr. Elizabeth Croft.
- March 28, 2015 - Engineering Explorations 10 & Quantum Leaps Burnaby, BC, My Engineering Experience – Travelling with Friends, Dr. Elizabeth Croft & Charlie PR2. (2 keynote speeches)

ON LEADERSHIP DEVELOPMENT

- March 28, 2011 - Stantec, Vancouver, BC, WinSETT Leadership Development Workshop, Dr. Elizabeth Croft, Jennifer Pelletier.
- October 24, 2011 - WorksafeBC, Richmond BC, WinSETT Leadership Development Workshop, Dr. Elizabeth Croft, Jennifer Pelletier.
- October 25, 2011 - Stantec, Kelowna, BC, WinSETT Leadership Development Workshop, Dr. Elizabeth Croft, Jennifer Pelletier.
- October 26, 2011 - WorleyParsons, Victoria, WinSETT Leadership Development Workshop, Dr. Elizabeth Croft, Jennifer Pelletier.
- October 27, 2011 - Teck, Vancouver, BC, WinSETT Leadership Development Workshop, Dr. Elizabeth Croft, Jennifer Pelletier.
- May 4, 2012 - CCWESTT Conference, Halifax NS, Advancing Women’s Leadership in SETT Fields, Dr. Elizabeth Croft, Jennifer Pelletier.
- October 25, 2012 - APEGBC AGM Conference, University of Victoria, ON, Building Leadership Diversity – Becoming Leaders Workshop for Women Engineers, Dr. Elizabeth Croft, Jennifer Pelletier (2 presentations).
- October 26, 2012 - APEGBC AGM Conference, University of Victoria, ON, Building Leadership Diversity – Becoming Leaders Workshop for Women Engineers, Dr. Elizabeth Croft, Jennifer Pelletier.
- June 18, 2013 - Canadian Engineering Education Association Conference, Montreal, QC, Global Engineering Leadership, Dr. Elizabeth Croft, Paul Winkelman, Alaya Boisvert, Kristin Patten.
- June 18, 2013 - Canadian Engineering Education Association Conference, Montreal, QC, Leadership Development Programs for Women in Engineering Industry, Dr. Catherine Mavriplis, Dr. Elizabeth Croft.
- June 2, 2015 - Women in STEM Workshop Series, Whitehorse, YT, **Leadership**, Dr. Elizabeth Croft, Dr. Lesley Shannon, Jennifer Pelletier.

### ON MENTORSHIP

- September 30, 2011 - APEGA Annual Mentoring Conference, Calgary, AB, **Keynote Speech**, Dr. Elizabeth Croft.
- September 20, 2013 - APEGA Annual Mentoring Conference, Calgary, AB, **Practical Mentorship**, Dr. Elizabeth Croft.
- September 20, 2013 - APEGA Annual Mentoring Conference, Calgary, AB, **Workshop: Practical Mentoring**, Dr. Elizabeth Croft.
- March 12, 2015 - UBC Women in Science and Engineering Networking Night, Dr. Sheryl Staub-French.
- June 1, 2015 - Women in STEM Workshop Series, Whitehorse, YT, **Practical Mentorship**, Dr. Lesley Shannon, Jennifer Pelletier.

### ON IMPOSTER SYNDROME

- January 21, 2011 – UBC Vancouver, **Imposter Panel: Feel like you don’t quite measure up?** Dr. Elizabeth Croft.
- January 22, 2014 - UBC Okanagan, **Imposter Panel**, Dr. Elizabeth Croft.

### ON SALARY NEGOTIATIONS

- February 24, 2011 - APEGBC & UBC Salary Seminar/Industry Night 2011, **How Much Are You Worth?** Dr. Elizabeth Croft.
- January 24, 2012 - UBC Vancouver Computer Science Salary Seminar, **How Much Are You Worth?** Dr. Elizabeth Croft.
- February 27, 2013 - APEGBC & UBC Salary Seminar/Industry Night 2013, **How Much Are You Worth?** Dr. Elizabeth Croft.
- April 1, 2014 - BCIT, Salary Seminar, **How Much Are You Worth?** Dr. Sheryl Staub-French.
- May 22, 2014 - CCWESTT Conference, Regina, SK, **How Much are you Worth? Keynote Speech**, Dr. Elizabeth Croft.
- March 19, 2015 - BCIT, **Salary Seminar**, Dr. Elizabeth Croft.

### ON ENGENDERING ENGINEERING SUCCESS

- May 23, 2014 - CCWESTT Conference, **Engendering Engineering Success**, Dr. Elizabeth Croft, Dr. Toni Schmader, Jennifer Pelletier.
- March 27, 2015 - ACEC-BC Meeting, Dr. Elizabeth Croft.
**ON RECRUITMENT, RETENTION, AND OUTREACH**

- October 14, 2012 - UBC Vancouver, Association of Canadian Chairs of Chemical Engineering, *Presentation on Recruiting and Retaining Women Faculty*, Dr. Elizabeth Croft.
- November 20, 2014 –, Real Property Institute of Canada National Workshop, Ottawa, ON, Dr. Sheryl Staub-French.
- May 27, 2015 - APEGBC DAWEG Seminar on Recruiting, Retention, *Growth and Advancement of Women in Engineering and Geoscience*, Dr. Sheryl Staub-French.

**INTERACTIVE STEM EXPERIENCES**


**SUPPORTING STUDENT DIVERSITY INITIATIVES**


**ON PROJECT MANAGEMENT**

- January 10, 2011 - WWEST Partners Workshop, UBC Vancouver, *WWEST Partners Funding*, Dr. Elizabeth Croft, Jennifer Pelletier.

**ON EFFECTIVE MEASUREMENT:**

ON HUMAN–ROBOT INTERACTIONS

- September 1, 2011 - TECK Resources, Human Robot Interaction, Applications to Mining, Dr. Elizabeth Croft.
- June 13, 2013 - HR MacMillan Space Centre, Vancouver, BC, Transforming Human-Robot Interaction, Dr. Elizabeth Croft.
- October 23, 2014 - Selkirk College, Quantum Leaps with KAST GLOWS (via livestream), Keynote Speech, Dr. Elizabeth Croft.

NATIONAL NETWORK RÉSEAU NATIONAL OF CHAIRS FOR WOMEN IN SCIENCE AND ENGINEERING

- April 29, 2011 - CCWE +20 National Workshop Project, Dr. Elizabeth Croft.
- November 13, 2013 - Gender Summit 3 Conference, Washington, D.C., Best Practice Training Workshops: The NSERC Model, Dr. Elizabeth Croft, Serge Villemure, Dr. Annemieke Fahrenhorst, Dr. Catherine Mavriplis, Dr. Tamara Franz-Odendaal.
- November 15, 2013 - Gender Summit North America, Best Practice Training Workshops: The NSERC Model CWSE Program, Dr. Elizabeth Croft, Dr. Catherine Mavriplis, Dr. Annemieke Fahrenhorst, Dr. Tamara Franz-Odendaal.
- May 24, 2014 - CCWESTT Conference, Call to Action NSERC, Dr. Elizabeth Croft, Dr. Catherine Mavriplis, Dr. Annemieke Fahrenhorst, Dr. Tamara Franz-Odendaal.

CONFERENCES & WORKSHOPS ORGANIZED BY WWEST

CREATING CONNECTIONS

- September 24, 2011, Creating Connections 2.0, Loon Lake, Maple Ridge, BC, Dr. Elizabeth Croft, Jennifer Pelletier, Heather Gerrits (Organizers).
- May 10, 2013 - UBC Vancouver, Creating Connections 3.0, Dr. Elizabeth Croft, Jennifer Pelletier, Noor Teja, Justin Yang (Organizers).

ENGINEERING IN YOUR CLASSROOM: TEACHERS’ CONFERENCE

- October 22, 2010 - UBC Vancouver, Teachers’ Conference, Dr. Elizabeth Croft, Jennifer Pelletier, Heather Gerrits (Organizers).
- October 21, 2011 - UBC Vancouver, Teachers’ Conference, Dr. Elizabeth Croft, Jennifer Pelletier, Kyle Philibert (Organizers/Speakers).
- October 24, 2014 - UBC Vancouver, Engineering in Your Classroom, Dr. Sheryl Staub-French (Keynote Speech), Jennifer Pelletier, Rebekah Parker, Natasha Palmer.

GO ENG GIRL! ENGINEERING EXPLORATIONS 9

- October 18, 2014 - UBC Vancouver, Engineering in Your Classroom, Dr. Sheryl Staub-French (Keynote Speech), Jennifer Pelletier, Rebekah Parker, Natasha Palmer.
ENGINEERING EXPLORATIONS 10 (FORMERLY ENGINEERING POWER UP!)

- April 19, 2013 – UBC Vancouver, Women in Engineering Luncheon, Dr. Elizabeth Croft, Jennifer Pelletier
- April 28, 2014 - UBC Vancouver, Engineering Power Up!
- March 28, 2015 - UBC Vancouver, Engineering Explorations 10, Dr. Sheryl Staub-French, Dr. Elizabeth Croft, Jennifer Pelletier, Rebekah Parker

ENGINEERING EXPLORATIONS 8: INTRODUCE A GIRL TO ENGINEERING DAY

- April 26, 2014 - Steveston-London Secondary School, Richmond, BC, Introduce a Girl to Engineering Day, Jennifer Pelletier, Dr. Sheryl Staub-French

PROMOTION TO PROFESSOR WORKSHOP

- May 19-21, 2015 - Dr. Elizabeth Croft, Jennifer Pelletier, Rebekah Parker.

FOURTEEN NOT FORGOTTEN MEMORIAL SERVICES

- November 30, 2011 - UBC EDC, Dr. Elizabeth Croft, Jennifer Pelletier, Kyle Philibert. (Participants).
- December 6, 2012 - DAWEG December 6th memorial, Dr Elizabeth Croft.
- December 6, 2012 - UBC Vancouver, Dr. Elizabeth Croft (Consultant).
- November 18, 2014 - UBC Vancouver, Jennifer Pelletier, Dr Sheryl Staub-French, Dr. Elizabeth Croft (Co-organizers).
APPENDIX 10:

GENDER DIVERSITY 101
Unconscious bias refers to the assumptions and conclusions we jump to without thinking.\(^1\)

An example might be assuming that an older person walking with a child is their grandparent. These biases do not indicate hostility towards certain groups; they reflect how the individual has been socialized.

Several studies demonstrate the impact unconscious bias can have on the hiring process, particularly for women.

These biases may not be intentional, but their impact is severe. The effects of unconscious bias will not be overcome by maintaining our current efforts to recruit and retain more women.\(^2\)

To reduce unconscious bias in hiring, committees and individuals need to be educated about its existence and effects in academia and industry.

Online tools such as the Harvard Implicit Association Test can help identify an individual's unconscious biases. Sharing research and becoming aware of your organization's hiring tendencies can also help reduce unconscious discrimination.

To be seen as equally “competent” by reviewers, female researchers need to publish:

- 3 more articles in *Nature* or *Science* OR 20 more articles in specialist journals

than male applicants when applying for a medical fellowship.\(^5\)

“We would have to see her job talk”

“I would need to see evidence that she had gotten these grants and publications on her own”

Psychology professors reviewing identical CVs were 4x more likely to write cautionary comments for female applicants.\(^4\)

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Psychology professors reviewing identical CVs were 4x more likely to write cautionary comments for female applicants.\(^4\)

Reference letters for female medical faculty were shorter, more vague, and placed less emphasis on research than those for males.\(^6\)

<table>
<thead>
<tr>
<th>Percentage of letters that contained the phrase:</th>
<th>Female (♀)</th>
<th>Male (♂)</th>
</tr>
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<tbody>
<tr>
<td>“compassionate” or “relates well with patients/staff”</td>
<td>4%</td>
<td>16%</td>
</tr>
<tr>
<td>“accomplishment” and “achievement”</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>“successful”</td>
<td>3%</td>
<td>7%</td>
</tr>
</tbody>
</table>

The average letter length for women was 227 words, compared to 253 words for men.\(^6\)

Women are 50% more likely to advance in an orchestra audition if they can’t be seen.\(^3\)

US science professors were asked to evaluate a CV for a lab manager.\(^2\)

The male candidate was offered a higher salary...

... more mentorship

... and was rated more “competent” and “hireable.”

The catch? Other than the names at the top, the CVs were identical.\(^2\)
References


Recommended Readings

2. Harvard Implicit Association Test: https://implicit.harvard.edu/

More resources can be found at: http://wiseli.engr.wisc.edu/

About WWEST

Westcoast Women in Engineering, Science & Technology (WWEST) is the operating name for the NSERC Chair for Women in Science and Engineering (CWSE), BC and Yukon Region. Our mission is to advance engineering and science as welcoming careers that serve our world through holistic understanding and creative, appropriate and sustainable solutions. WWEST works locally and, in conjunction with the other CWSE Chairs, nationally on policy, research, advocacy, facilitation, and pilot programs that support women in science and engineering.

About the Chairholder

The Chair is held by Dr. Elizabeth Croft, P.Eng., FEC, FASME. Dr. Croft is the Associate Dean, Education and Professional Development in the Faculty of Applied Science, and a Professor of Mechanical Engineering at the University of British Columbia. She is also the Director of the Collaborative Advanced Robotics and Intelligent Systems (CARIS) Laboratory. Her research investigates how robotic systems can behave, and be perceived to behave, in a safe, predictable, and helpful manner. She is the lead investigator of “Engendering Engineering Success,” a 3-year interdisciplinary research project that aims to take an evidence-based approach to increasing the retention of women in engineering by understanding and changing aspects of workplace culture that place women at a disadvantage.

Thank you to our sponsors

Lead Sponsors: UBC Faculty of Applied Science, BC Hydro, Dr. Ken Spencer, WorleyParsons Canada Ltd., Teck Resources Limited, Stantec Consulting, and Henry F. Man.

Contributing Sponsors: Ms. Catherine Roome, Mr. Stanley Cowdell, Division for the Advancement of Women in Engineering and Geoscience, Nemetz (S/A) & Associates Ltd., and Glotman Simpson Consulting Engineers.

Supporters: Karen Savage, P.Eng and Golder Associates Ltd.
Why Mentoring?

Women who have a mentor can advance more quickly, and to higher levels, than those who are not supported. Mentoring relationships can be formal or informal, and short or long term.

Formal relationships are often arranged by an organisation or workplace, have pre-articulated expectations, and often include launches, wrap-ups, and socials to normalize expectations. Formal mentorships create an environment where it is easy to get involved, but may cause concerns of time commitment and how “visible” the relationships are.

Informal mentoring is often arranged by individuals, so expectations are not always pre-determined and must be set by the mentor and mentee. They often focus on a specific need. Time commitments are more flexible, and informal mentorship is less “visible.” Difficulty establishing connections can make it challenging to become involved.

Short term mentoring formats include speed mentoring, project-specific mentors, shadowing, or transition mentors.

Long term mentoring may include regular or ad-hoc meetings, peer mentors, and most mentoring programs.

Online mentoring may use either format.

What is Mentoring?9,10

Advice and modelling

Development for upward mobility

Personal support navigating the workplace environment

Effective mentoring relationships address both how and why questions

Explores values and uses critical reflection

What is Mentoring?

Advice and modelling

Development for upward mobility

Personal support navigating the workplace environment

Effective mentoring relationships address both how and why questions

Explores values and uses critical reflection
Facilitative Conditions

**Friendliness**
- Sharing mutual interests
- Genuine warmth
- Genuine sense of comfort and support

**Understanding**
- Empathy
- Perceive and acknowledge their experiences

**Caring**
- Value them as a person
- Personal commitment to the process
- Personally care about their well-being

**Respect**
- Right to express their own ideas and feelings
- Right to shape their own lives

**Trustworthiness**
- Confidentiality and security in relationship
- Honesty

**Acceptance**
- Accept who they are
- Respect the personal worth and dignity of a person

6 conditions must be met to create a relationship in which a person feels comfortable to self-disclose. In a mentorship, this relationship is reciprocal.

Types of Questions

**Effective:**
- Are person-centred
- Are open
- Ask “why” (without being intimidating)

**Ineffective:**
- Completely change the focus
- Are binding
- Solicit agreement
- Force choices
- Have “no good answer”
- Are yes/no

Tools for Mentoring

Preparing for Mentoring
- Decide what you want to get from this experience
- Determine what you can give (time, knowledge)
- Know your own values
- Review the facilitative responses
- Decide on 3 questions you want to ask

Setting Expectations
- Set & communicate expectations (meetings, forms of communication, etc.)
- Discuss any limitations to the relationship, confidentiality, what to do if one person wants to end the relationship
- Write this into a simple agreement

Building the Facilitative Conditions
- Find common ground (personal, professional interests)
- Leave the workplace – go for a walk, or for coffee
- Use open questions & positive body language
- Talk about why mentoring appeals to you, previous valuable mentoring relationships you’ve had, and how they were helpful

Tools to Explore
- Choose a specific topic to focus on for each individual session
- Have the mentee create a pie chart of what is important in their life
- Then create one of what they spend their time on – compare & discuss
- Approach issues with PEST analysis: Political, Economic, Social, Technology

Tools to Reflect
- Review highlights from the meeting at the end
- At home, spend 15 minutes writing about what you learned, what was helpful, what you’d like to do next time
- At the end of the mentoring relationship, or yearly, reflect on how it has contributed to your growth and development

In a mentoring relationship, how you respond affects how the other person responds. Choosing a response is context and relationship dependent.
In a mentoring relationship, how you respond affects how the other person responds. Choosing a response is context and relationship dependent. Understanding reflects and conveys the other person’s feelings, including their emotional experience. Competence in understanding helps the other person feel heard and understood, which in turn builds trust and respect. The next four competencies, clarifying, summarizing, questioning, and accepting, involve actively listening to what the other person is saying, as well as reflecting on and summarizing the information shared. Respect involves valuing another person as a person, which indicates a belief in their ability to solve the problem and make effective choices. Appreciation involves valuing and accepting who someone is, which is a reciprocal process. Caring involves valuing and appreciating the other person’s ability to express their ideas and feelings. Empathy, in turn, means acknowledging their personal experiences and needs, and assigning value to their ideas. Finally, genuineness involves being genuine and authentic in the relationship. Facilitative responses are responses that contribute to a relationship in which a person feels comfortable to self-disclose. In a mentorship, this relationship is reciprocal. The next diagram presents the facilitative conditions that need to be met to create such a relationship. The diagram also includes a list of types of questions, effective and ineffective. Effective questions are person-centred, open, and ask why without being intimidating. Ineffective questions change the topic, are binding, get agreement, force choices, have no good answer, or are yes/no. The final section of the page presents tools for mentoring, including preparing for mentoring, setting expectations, building the facilitative conditions, tools to explore, and tools to reflect. Each tool is described in detail, and the page includes a sidebar about mentoring at work.
References


Recommended Readings


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In a blind resume study, male candidates were offered higher salaries, more mentorship, and were rated as more “competent” and “hireable,” than women, despite the candidates’ resumes being identical.17

Several issues need to be addressed to retain a diverse workforce. The “old white boys’ club”3 that excludes others from informal networking, a lack of managerial awareness about diversity issues, poor work-life balance, and discriminatory behaviours against minority employees can dissuade all workers from being loyal to an employer in the long term.3,19

Promoting diversity is not limited to gender; workplaces should be inclusive and welcoming to all.

The benefits of creating an inclusive workplace include low turnover, higher employee engagement, improved client relationships and satisfaction, stronger fiscal performance, and improved governance.4,5,6

This paper highlights eight ways to recruit, support and retain a diverse workforce in organisations.
Negative interpersonal experiences at work are associated with lower organizational commitment and life satisfaction for women. 

Men in exclusive and stressful workplaces, report having poor physical health, including heart conditions.

Monitor the working climate and foster a positive, inclusive work culture.

Provide professional development opportunities for all employees, on company time.

LGBT employees are happier at organisations with leadership programs.

Non-traditional mentoring includes: Speed Mentoring, Virtual Mentoring, Professional development programs, Mentoring Programs.

Have a zero tolerance policy for derogatory comments or actions.

Try the Implicit Bias test: https://implicit.harvard.edu/

Establish structured diversity measures: 
- Include diversity as part of all employee's reporting.
- Track diversity (ethically); 
- Reflect your commitment in marketing and communications; 
- Report on progress.

Assign accountability for diversity and track your progress.

Create a culture of diversity:
- Safety? Think safe.
- Diversity comes from a safety culture.
- Think diverse.

Why do women leave work?

60% of highly qualified women have nonlinear careers.
Historically, 24% of highly qualified men also have nonlinear careers.
75% of the Millennial generation expect to have 2-5 employers in their life.

The Benefits of Change

Employees are more satisfied and committed when they have positive work relationships with managers and colleagues. By supporting diversity, managers and organisations can foster positive work cultures for all.

Committing to change can make a difference; UBC’s Faculty of Science went from having no women in senior leadership positions from 2003-2007 to having 5/13 senior faculty positions held by women from 2007-2010.

Managers should celebrate their successes and be open to a wide range of communication styles. While the inequality gap tends to increase over time, taking direct action such as assigning accountability for diversity can lead to short and long term changes.

Training and feedback can be an effective method for eliminating managerial bias and inequality. Opportunities for technical and leadership development need to be available to employees of all ranks.

Allowing workers to off-ramp partially or completely and welcoming them back later without penalty, combating stigma and stereotypes by training staff to be self-reflective and deconstruct their own processes, and making organizational decision-making as transparent as possible helps build a culture of diversity within organisations.

WIWEST is currently researching which specific policies best support gender diversity in the workplace.
References


Recommended Readings


Over 20 years of research demonstrates a correlation between organisations with high gender diversity in leadership and several measures of organisational success. Gender diversity is linked to employee satisfaction, improved governance and innovation. It is also associated with financial benefits, including a positive impact on firm value.

While some boards do currently have female members, discrimination still exists as women are more likely to be board members than chairs.

To benefit from gender diversity, organisations should avoid tokenism and ensure there is a “critical mass” of women represented. This means having at least 2-3 women, or at least 30% of the board. While correlation does not indicate causation, there is a clear relationship between an organisation’s gender diversity and aspects of their success. Longitudinal studies found a correlation between promoting women to executive positions and high profitability over 20+ years.

In order for change to occur, a paradigm shift is needed where organisations’ leadership values diversity, recognises the challenge of expressing diverse opinions, and aims to support the professional development of all employees.

*WBD: Women Board Directors; stats from 2004-2008

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**Economic Benefits**

- Fortune 500 companies with the most women on board of directors outperformed companies with the least.
- Similar results apply to Canadian corporations.

**Improved Governance**

- Gender diverse boards are more likely to allocate effort into corporate monitoring, and increase participation in decision-making.

**Access to More Talent**

- Women directors: improve a firm’s ability to navigate complex strategic issues, positively influence board strategic direction & tasks, women are more “prepared to push the ‘tough issues’”
- Gender diversity has a positive effect on team innovation in radical research

**More Innovation**

- If a group includes more women, the collective intelligence rises
- Having a critical mass of 30% or at least 2 or 3 women on a board decreases groupthink.

---

**Graphic Elements**

- Bar charts showing correlation between gender diversity and organisational success indicators.
- Icons illustrating priorities such as improve a firm’s ability to navigate complex strategic issues, positively influence board strategic direction & tasks, women are more “prepared to push the ‘tough issues’”.

---

**Footnotes**

1, 3, 21, 22, 8, 16, 17, 23, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 12, 24, 13
References


Recommended Readings


About WWEST

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More information and resources at: http://wwest.ca
Gendered Language & Stereotype Awareness for Hiring Committees

Gender segregation is the tendency for women to work in systematically different occupations and industries than men. This often occurs at critical career points, which can dissuade women from continuing in male-dominated industries.

Women grow more aware of the “glass ceiling” as they advance in their careers:

- Women with children experienced declines in earnings and hours worked;
- Men with children correlated with increased earnings and virtually unchanged hours.

Gender Discrimination Exists

Certain stereotypes, unconscious bias, and communication styles can unknowingly influence impressions of candidates and jobs.

Women's behaviour tends to be stereotyped as communal (kind, thoughtful, sensitive to others' feelings, deferent), whereas men are stereotyped as agentic (competitive, decisive, aggressive, socially dominant). Women also are encouraged to be more self-assertive, but discouraged from advancing their interests at the cost of others.

Language can also be characterized as feminine or masculine; being more indirect, elaborate and emotional for the former, or more succinct, direct and instrumental for the latter.

These stereotypes and assumptions can impact a hiring committee's assessment of a candidate's abilities, as well as the candidate's assessment of a job description and their “fit” within an organisation.

Job ads with masculine language are less appealing to women, regardless of job type, and decreased their anticipated belonging to the organisation. Conversely, gendered language had no impact on men's anticipated belonging.

Stereotypes & Their Effects

Stereotype: Men

- Agentic: competitive, decisive, aggressive, socially dominant

Stereotype: Women

- Communal: kind, thoughtful, sensitive to others, deferent

Traditionally, companies have valued agentic behaviour over communal behaviour.

Some women counteract negative stereotypes by adopting a more masculine communication style.

This can be effective for some women, but not all. Agentic behaviours have social costs.
Gendered wording subtly signals who belongs and who doesn’t. Below are examples of language in job advertisements and qualities of candidates.

**Feminine**
- A company’s “excellence” in the market
- “Understand markets to establish appropriate selling prices”
- “We are committed to providing top-quality healthcare that is sympathetic to the needs or patients”

**Masculine**
- A company’s “dominance” in the market
- “Analyze markets to determine appropriate selling prices”
- “We are determined to deliver superior medical treatment tailored to each individual patient”

---

**Word Choice Matters**

- **Feminine**
  - Compassionate care that is sympathetic to committed prices
  - Establish appropriate selling prices in the market
  - Respect from coworkers

- **Masculine**
  - Competitive delivery of medical treatment
  - Determine appropriate selling prices in the market
  - Direct project groups to manage project progress and ensure accurate task completion

---

**Women in Leadership Positions**

- Use of Communal behaviour
- Use of Agentic behaviour

- **Observations**
  - Respect from coworkers
  - Both actions carry a risk of being disqualified from a job application.

---

**Observed Effects of Women Using Forced Agentic Behaviour**

- **Increase**
  - Women’s competence scores to equally agentic men

- **Decrease**
  - Compliance of workers for managers

- If women need to manage the impressions they give off, it can lead to stress, anxiety and reduced task performance.

---

**Interview Best Practices**

- **Job technical and skill requirements**
- **Go beyond the technical details and workplace climate**
- **Expectations for availability and travel**
- **How do current employers handle family demands?**

- **What benefits do you offer?** (Vacation, Compensation, including work-life balance provisions)
- **Is this what I want to do?** (Is it consistent with the individual’s identity?)

---

**What Can We Do?**

- Gendered language is not a deliberate process - most job ads only contain 1% gendered language. When attracting women to a job, flexible working hours and work-life balance are important, as well as ensuring they have a sense of anticipated belonging in the organisation. In the study of MBA graduates, women were no less likely to receive offers in masculine jobs; the segregation occurred in the application process where women self-selected the jobs they believed they fit.

- Women’s leadership potential should be maximized through professional development, mentoring, and proactively identifying talented individuals and encouraging them to apply for upper level jobs. The negative effects of communal communication stereotypes can also be eliminated through self-affirmation exercises.
Below are examples of language in job advertisements and qualities of candidates.

Gendered wording subtly signals who belongs and who doesn’t. Below are examples of language in job advertisements and qualities of candidates.

**Feminine**
- A company’s “excellence” in the market
- “Understand markets to establish appropriate selling prices”
- “We are committed to providing top-quality health care that is sympathetic to the needs or our patients”

**Masculine**
- A company’s “dominance” in the market
- “Analyze markets to determine appropriate selling prices”
- “We are determined to deliver superior medical treatment tailored to each individual patient”

**Observed Effects of Women Using Forced Agentic Behaviour**
- Increase “h’s competence scores to equally agentic men
- Seem more threatening; less persuasive & less influential
- Decrease compliance of workers for
- If women need to manage the impressions they give off, it can lead to stress, anxiety and reduced task performance.

**Word Choice Matters**

Gendered language has no impact on men’s decision to apply, but may dissaue women. It also goes unnoticed in job advertisements; even when explicitly pointed out.

### Gendered Job Descriptions

<table>
<thead>
<tr>
<th>Feminine</th>
<th>Masculine</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Proficient oral and written communication skills”</td>
<td>“Strong communication and influencing skills”</td>
</tr>
<tr>
<td>“Collaborates well in a team environment”</td>
<td>“Ability to perform individually in a competitive environment”</td>
</tr>
<tr>
<td>“Sensitive to the client’s needs, can develop warm client relationships”</td>
<td>“Superior ability to satisfy customers and manage company’s association with them”</td>
</tr>
<tr>
<td>“Provide general support to project teams in a manner complimentary to the company”</td>
<td>“Direct project groups to manage project progress and ensure accurate task control”</td>
</tr>
</tbody>
</table>

### Deciding to Apply

3 main factors when individuals decide to apply:

- “Qualiﬁed”
  - Only partially meet the advertised job requirements?
  - Men are more likely to apply, regardless.
  - 85% of women would only apply to a job if they met the job description “fully” or “pretty well.”
  - Women are also less likely to apply for masculine-stereotyp ed jobs.

- Identification with the job
  - Is it consistent with the individual’s identity?

- Reward Preference
  - Financial, intellectual, schedule flexibility, etc.

- Expectation of Application Success
  - Men and women evaluate job decision factors differently because of gender role socialization.

### Interview Best Practices

- Job technical and skill requirements
- Go beyond the technical details and workplace climate
- Expectations for availability and travel
- How do current employers handle family demands?
- What benefits do you offer? Vacation, childcare, flexible, insurance, professional development, mentoring?

**What Can We Do?**

Gendered language is not a deliberate process – most job ads only contain 1% gendered language but impact women’s application decisions. Increasing feminine language in job descriptions can increase women’s interest in the job.

Organisations need to rethink their hiring process, and should ensure career advancement reflects skills and capabilities instead of emphasising time served. When attracting women to a job, flexible working hours and work-life balance are important, as well as ensuring they have a sense of anticipated belonging in the organisation. In the study of MBA graduates, women were no less likely to receive offers in masculine jobs; the segregation occurred in the application process where women self-selected the jobs they believed they fit.

Women’s leadership potential should be maximized through professional development, mentoring, and proactively identifying talented individuals and encouraging them to apply for upper level jobs. The negative effects of communal communication stereotypes can also be eliminated through self-affirmation exercises.
References

Recommended Readings

About WWEST
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- “understand markets to establish appropriate selling prices”
- “We are committed to providing top quality health care that is sympathetic to the needs or our patients”

**Masculine**
- a company’s “dominance” in the market
- “analyze markets to determine appropriate selling prices”
- “We are determined to deliver superior medical treatment tailored to each individual patient”

**Sample Gendered Words**

<table>
<thead>
<tr>
<th>Feminine</th>
<th>Masculine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affectionate</td>
<td>Active</td>
</tr>
<tr>
<td>Cheer*</td>
<td>Adventurous</td>
</tr>
<tr>
<td>Commit*</td>
<td>Aggress*</td>
</tr>
<tr>
<td>Communal</td>
<td>Ambitio*</td>
</tr>
<tr>
<td>Compassion*</td>
<td>Analy*</td>
</tr>
<tr>
<td>Connect*</td>
<td>Assert*</td>
</tr>
<tr>
<td>Considerate</td>
<td>Athlet*</td>
</tr>
<tr>
<td>Cooperat*</td>
<td>Autonom*</td>
</tr>
<tr>
<td>Depend*</td>
<td>Challenge*</td>
</tr>
<tr>
<td>Emotiona*</td>
<td>Compet*</td>
</tr>
<tr>
<td>Empath*</td>
<td>Confident</td>
</tr>
<tr>
<td>Flatterable</td>
<td>Courag*</td>
</tr>
<tr>
<td>Gentle</td>
<td>Decide</td>
</tr>
<tr>
<td>Honest</td>
<td>Decisive</td>
</tr>
<tr>
<td>Interdependen*</td>
<td>Decision*</td>
</tr>
<tr>
<td>Interpersona*</td>
<td>Determin*</td>
</tr>
<tr>
<td>Kind</td>
<td>Domina*</td>
</tr>
<tr>
<td>Kinship</td>
<td>Force*</td>
</tr>
<tr>
<td>Loyal*</td>
<td>Hierarch*</td>
</tr>
<tr>
<td>Nurtur*</td>
<td>Hostil*</td>
</tr>
<tr>
<td>Pleasant*</td>
<td>Independen*</td>
</tr>
<tr>
<td>Polite</td>
<td>Individual*</td>
</tr>
<tr>
<td>Quiet*</td>
<td>Intellect*</td>
</tr>
<tr>
<td>Respon*</td>
<td>Lead*</td>
</tr>
<tr>
<td>Sensitiv*</td>
<td>Logic</td>
</tr>
<tr>
<td>Submissive</td>
<td>Objective</td>
</tr>
<tr>
<td>Support*</td>
<td>Opinion</td>
</tr>
<tr>
<td>Sympath*</td>
<td>Outspoken</td>
</tr>
<tr>
<td>Tender*</td>
<td>Persist</td>
</tr>
<tr>
<td>Together*</td>
<td>Principle*</td>
</tr>
<tr>
<td>Trust*</td>
<td>Stubborn</td>
</tr>
<tr>
<td>Understand*</td>
<td>Superior</td>
</tr>
<tr>
<td>Warm*</td>
<td>Self-confiden*</td>
</tr>
<tr>
<td>Yield*</td>
<td>Self-sufficien*</td>
</tr>
<tr>
<td></td>
<td>Self-relian*</td>
</tr>
</tbody>
</table>
Stereotype Threat

refers to the concern with being viewed through the lens of a stereotype.¹

Stereotyped threat is caused by cues in the situation that remind people of negative stereotypes.¹³,¹⁸

Anxiety over confirming these stereotypes can impair an individual's ability to perform up to their full potential.²

Research has shown that stereotype threat negatively impacts: women's math performance¹ (compared to men's), White men's math performance⁴ (compared to Asian men), men's social sensitivity⁵ and spatial abilities⁶ (compared to women's), White athletic performance⁶ (compared to Black), and Black students' verbal problem-solving abilities¹ (compared to White students').

Stereotype threat may be a significant factor in undermining women's success and persistence in engineering.¹⁹ This has important implications for STEM fields. A simple reminder of one's race or gender is enough to elicit stereotype threat.¹⁸

STEM fields should consider ways to create identity safe environments to help people overcome stereotype threat.

By actively raising awareness about stereotype threat, providing role models, and encouraging self-affirmation exercises, individuals' performances are more likely to match their potential.

---

**Environment Triggers**

Don't...

... define people by their gender,

... or their group,

... or stereotype on performance expectations

You must be athletic!

"Women aren’t good at math"

- **Don’t...**

- **... define people by their gender,**

- **... or their group,**

- **... or stereotype on performance expectations**

**Impact on STEM**

Reduced:

- **Performance**¹⁷ of women & minority students on the SAT, by 50 points¹⁸

- **Job Engagement & Organizational Commitment** in academia¹¹ & in the engineering industry¹²

**Coping Strategies & Alleviating the Threat**

- **Role Models**
  - Show that others have struggled and succeeded ⁹,¹⁷,²⁰

- **Self-Affirmation**
  - Write about your core values²¹

- **Reframing the Situation**
  - Create identity safe contexts e.g. gender-fair tests³

- **Learning about Stereotype Threat**
  - Performance improves when stereotype threat is explained before a test⁴,¹⁵,¹⁹

- **Attribute the anxiety to the stereotype, not the self**¹⁶

---

"Threat in the air"⁸

Integrated process model of stereotype threat
(adapted from Schmader, Johns, & Forbes, 2008)¹⁶

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References

Recommended Readings
2. Dr. Toni Schmader’s website: http://schmader.psych.ubc.ca/research.html

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What is Engineering?
Applying science in everyday life.

ENGINEERING:

- creative
- engaging
- rewarding

a profession where people

solve problems
design solutions
help local & global communities
and love what they do

With a Bachelor's Degree in Engineering...
Graduates are industry-ready & hireable.

Median entry-level salary in B.C.: $57,141¹
Median engineering base salary in B.C.: $87,000¹

95,000+ jobs will be available by the end of 2020 due to retiring engineers.²

What skills do I need?
- Problem-solving
- Adaptable
- Leadership
-Curiosity
- Communication
- Creativity
- Teamwork
- Attention to detail

Working Climate
Engineers work in...

- urban centres,
- rural communities,
- & around the world.

They can work in the field, in the office, or both.

The Washington Accord allows mobility for P.Engs among 10 countries.

Learn more

www.engineeryourlife.org/
www.egfi-k12.org/
www.apeg.bc.ca/For-Students/
High-School-Students
www.wwest.ca
Next Steps to Becoming an Engineer...

Gr. 12 Chemistry, English, Math, & Physics*

Apply to an accredited program
Undergraduate Experiences

Co-op Paid Work Experience
Community Based Learning

International Experiences

Graduate

Mentoring Programs
Student Government

Student Design Teams

Professional Associations

Non-profit Engagement

Give Back

Engineer in Training (EIT)

P.Eng Licence

Work in Industry

International Work

Law, Medicine, or Business

Undergraduate Experiences

Check out these videos from WISEatlantic to learn more about engineering careers:

http://youtu.be/JqBLHsNAhBI
http://youtu.be/dGPPsHh8k0
http://youtu.be/Za1JoqYBF-Q
http://youtu.be/oW2xTH-Z4mE

More videos available at: www.WISEatlantic.ca/Videos.asp

This Could Be You

AJung Moon

“I design nonverbal communication cues like hand gestures and gaze for robots so that they can collaborate with people better.”

Kristy Meents

“Working in oil and gas - one of Canada’s largest economies - leads to a lot of amazing opportunities.”

Belinda Li

“Engineering has helped me think creatively to work on solving complex global problems, like making sure people have reliable and sustainable access to safe drinking water.”

Hillary Kernahan

“As a Building Envelope Engineer, every day we are challenged to investigate and solve existing issues in buildings and design and construct better performing and longer lasting buildings.”

References


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More information and resources at: http://wwest.ca
APPENDIX 11:

STEM ORGANIZATIONS IN BC, YUKON AND CANADA
BC & YUKON OUTREACH GROUPS

- eng•cite, [http://engcite.engineering.ubc.ca/](http://engcite.engineering.ubc.ca/)
  - Co-branded all Gender Diversity 101 White Papers
  - Co-organized all Engineering Explorations 8-10 events & Engineering in Your Classroom
- Engineers Without Borders, UBC Chapter, [http://ubc.ewb.ca/](http://ubc.ewb.ca/)
  - WWEST Partner (2014-2015), $250
- Geering Up, [www.geeringup.apsc.ubc.ca/](http://www.geeringup.apsc.ubc.ca/)
  - WWEST Partner (2011-2015), $18,750
- Genome British Columbia Geneskool, [http://www.genomebc.ca/education/outreach-programs/](http://www.genomebc.ca/education/outreach-programs/)
  - WWEST Partner (2011-2012), $2,600
  - WWEST Partner (2011-2013), $2,800
- IEEE Women in Engineering (WIE) Affinity Group, Vancouver, [http://vancouver.ieee.ca/content/wie](http://vancouver.ieee.ca/content/wie)
  - WWEST Partner (2011-2013), $1,500
- Kootenay Association for Science and Technology - Growing, Learning Opportunities with Science (KAST GLOWS), [http://kastglows.ca/](http://kastglows.ca/)
  - Partnered with WWEST for Quantum Leaps 2015 Keynote
  - WWEST Partner (2014-2015), $500
- Let’s Talk Science University of Victoria, [http://outreach.letstalkscience.ca/uvic.html](http://outreach.letstalkscience.ca/uvic.html)
  - WWEST Partner (2014-2015), $1,000
  - Co-branded all Gender Diversity 101 White Papers
  - Partnered with WWEST for Quantum Leaps Burnaby 2015
  - WWEST Partner (2012-2015), $12,000
- Science AL!VE, [http://www.sciencealive.ca/](http://www.sciencealive.ca/)
  - WWEST Partner (2014-2015), $500
- Science World, [http://www.scienceworld.ca/futurescienceleaders](http://www.scienceworld.ca/futurescienceleaders)
- Science Venture, [http://www.scienceventure.ca/](http://www.scienceventure.ca/)
  - WWEST Partner (2014-2015), $500
- UBC Advanced Molecular Biology Laboratory (AMBL), [http://www.bioteach.ubc.ca/](http://www.bioteach.ubc.ca/)
  - WWEST Partner (2014-2015), $5,500
- UBC Department of Physics and Astronomy, Outreach Program, [http://outreach.phas.ubc.ca/](http://outreach.phas.ubc.ca/)
  - WWEST Partner (2011-2013), $5,975
  - WWEST Partner (2011-2013), $4,500
- Vancouver Aquarium Outreach, [https://www.vanaqua.org/learn/outreach](https://www.vanaqua.org/learn/outreach)
OTHER OUTREACH GROUPS

- Actua, http://www.actua.ca/
- Canadian Association for Girls in Science, http://www.cagis.ca/

BC & YUKON POST-SECONDARY GROUPS

- Academic British Columbia Women in Engineering (ABCWiE), http://wie.engineering.ubc.ca/committees/
  - WWEST Partner (2011-2013), $2,400
  - WWEST Partner (2011-2012), $1,000
- Conference on Diversity in Engineering (formerly National Conference on Women in Engineering), http://cfes.ca/events-and-services/cde/
  - WWEST Partner (2014), in-kind
- Focus on Women in Computer Science, https://www.cs.ubc.ca/our-department/women
- Leadership Through Diversity at University of Victoria, https://onlineacademiccommunity.uvic.ca/ltd/
  - WWEST Partner (2011-2012), $200
  - WWEST Partner (2013-2014), $2,700
  - WWEST Partner (2013-2014), $3,000
- SFU Women in Computing Science (WICS), http://cgi.sfu.ca/~wics/
- Symposium for Women Entering Ecology and Evolution Today (SWEET), http://sweeetecoevo.weebly.com/
  - WWEST Partner (2012-2013), $1,000
  - WWEST Partner (2011-2014), $10,000
- UBC Faculty of Applied Science, http://apsc.ubc.ca/
  - Co-branded all Gender Diversity 101 White Papers as UBC Engineering
- UBC Faculty of Science, http://science.ubc.ca/
- UBC Okanagan Campus, http://ok.ubc.ca/welcome.html
  - WWEST Partner (2011-2013), $1,200
- UBC Women in Science Club, https://ubcwomeninscience.wordpress.com/
- University of Victoria, Faculty of Engineering, http://www.uvic.ca/engineering/
- University of Victoria, Women in Engineering and Computer Science (WECS), http://www.csc.uvic.ca/Outreach/wecs.htm
  - WWEST Partner (2011-2013), $3,800
BC & YUKON INDUSTRY GROUPS

- Association of Professional Engineers and Geoscientists of British Columbia, https://www.apeg.bc.ca/Home
  - Co-branded select Gender Diversity 101 White Papers
- BC Women in Technology (BCWiT), http://bcwit.com/
- Division for the Advancement of Women in Engineering and Geoscience (DAWEG), http://www.daweg.com/
- Multi-Lingual Orientation Service Association for Immigrant Communities (MOSAIC), http://www.mosaicbc.com/
  - WWEST Partner (2014-2015), $5,000
- Society for Canadian Women in Science and Technology (SCWIST), http://www.scwist.ca/
  - WWEST Partner (2011-2013), $3,825
- Women in Engineering, Vancouver (WIE-VR), http://wievr.ca/
  - WWEST Partner (2011-2013), $2,000
- Women in Mining (WIM) BC, http://www.wimbc.ca/
- Yukon Women in Trades & Technology (YWITT), http://www.yukonwitt.org/

OTHER INDUSTRY GROUPS

- Association de la francophonie à propos des femmes en sciences, technologies, ingénierie et mathématiques, http://www.affestim.org/
- Canadian Advanced Technology Alliance Women in Technology (CATA WIT), http://www.cata.ca/wit/
- Canadian Centre for Women in Science, Engineering, Trades and Technology (WinSETT Centre), http://www.winsett.ca/
- Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWESTT), http://www.ccwestt.org/
- Canadian Women in Technology (CanWiT), http://www.canwit.ca/
  - Cobranded all Gender Diversity 101 White Papers
- INWES Education and Research Institute, https://inwes.wordpress.com/
- Mining Industry Human Resources Council (MiHR), http://www.mihr.ca/
  - Distribution agreement of all Gender Diversity 101 White Papers
  - Partner in the Engendering Engineering Success Research Project
- Ontario Network of Women in Engineering (ONWIE), http://www.onwie.ca/
  - Cobranded all Gender Diversity 101 White Papers
- Society of Women Engineers, http://societyofwomenengineers.swe.org/
- Women in Communications and Technology (WCT), https://www.wct-fct.com/
- Women in STEM Knowledge Center, http://www.wskc.org/home/
NSERC CHAIRS FOR WOMEN IN SCIENCE & ENGINEERING (CWSE) ORGANIZATIONS AS OF AUGUST 2015

- WISEAtlantic, http://www.wiseatlantic.ca
  - Co-branded all Gender Diversity 101 Papers
- CWSE Prairies, http://cwse-prairies.ca/
- CWES Quebec, website coming soon

WWEST PARTNERS RESEARCH

- Design and Development of Active Mentorship and Intelligent Tutors in First Year, University of Victoria Department of Computer Science, Dr. Yvonne Coady (ycoady@cs.uvic.ca)
  - WWEST Partner (2014-2014), $2,000
- Gendered Words in Canadian Engineering Recruitment Documents (GWERP), Dr. Agnes d'Entremont (agnes.dentremont@ubc.ca), and Dr. Kerry Greer, UBC (Kerry.greer@ubc.ca)
  - WWEST Partner (2014-2015), $3860
APPENDIX 12:

WWEST PARTNERS REPORT SUMMARIES
INVESTING IN COLLABORATION AND PARTNERSHIPS

Edited by Rebekah Parker and Jennifer Pelletier
With foreword by Dr. Elizabeth Croft
And contributions from the WWEST Partners

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Dear Friends and Partners,

I write this foreword with a deep sense of wonder and gratitude. Wonder at what has been accomplished and gratitude to the many, many people who tirelessly- and happily - continue to open doors and invite girls and women be part of the wonderful and exciting opportunities in STEM - Science, Technology, Engineering and Math, in the BC and Yukon Region.

WWEST Partners owes much to the Jade Bridges Programme led by former NSERC Chair for Women in Science and Engineering, Anne Condon and before that, to the SWIFT project – Supporting Women in InFormation Technology, led by our first NSERC WISE chair – Maria Klawe. They, along with the pioneers in the Society for Canadian Women in Science and Technology and in the Division for Advancement of Women in Engineering and Geoscience laid the groundwork for the change in the regional conversation around gender in STEM that we have seen in the past five years. Providing the hub to bring these groups together, along with many others, has been one of the true accomplishments of the WWEST Partners program.

Of course, WWEST Partners would not have been realized without the support of the sponsors of the NSERC Chair for Women and Science and Engineering 2010-2015:

- UBC Faculty of Applied Science
- BC Hydro
- WorleyParsons
- Teck Resources Ltd.
- Stantec
- Dr. Ken Spencer
- Henry F. Man
- Ms. Catherine Roome, P. Eng.
- Mr. Stanley Cowdell, P. Eng.
- The Division for Advancement of Women in Engineering and Geoscience of APEGBC
- Nemitz & Associates
- Glotman Simpson Consulting Engineers
- Karen Savage, P.Eng.
- Golder Associates Ltd.

Jennifer Pelletier was the mastermind behind the coordination of this program and the nerve centre of the NSERC Chair – we are all indebted to her creative and organizational genius. I also want to extend a special thanks to the colleagues who gave of their time to select the partners and award the funding each year.

In bringing groups and individuals together to bond and to build– starting even before WWEST at the first Creating Connections conference in 2009 – WWEST Partners has become many things: a community quilt, a conversation – an ever-growing network of fun, exciting and interesting people who love what they do and truly want to give back. The network, based on simple ideas – bringing people together, providing seed funding, and supporting success and sustainability through training and professional development - has grown enormously. With the success of Creating Connections 4.0, the continuation of the NSERC Chair at Simon Fraser University with Professor Lesley Shannon, the establishment of the Goldcorp Professorship at UBC held by Professor Sheryl Staub-French, and the level of outreach, networking and advocacy activity across the BC-Yukon region, the network has truly taken a life of its own - well beyond any reasonable expectations. I am fully confident in the leadership for Women in STEM in the BC/Yukon region. Yes. we need to keep the pressure on, but the change is already visible – women are entering these careers in growing numbers, and succeeding at the highest levels.
Make a difference – follow the Ten Rock Rule.  

WWEST Partners is an example of the “Ten Rock Rule” - a rule I learned while walking on a beach path one day. This particular path allows everyone to walk down to the beautiful clear water without stumbling over the sharp, barnacle covered rocks which cover the beach. Each time you walk down the path, and each time you walk up the path you pick up 10 rocks - of any size, and toss them off the path. In this way, the path grows wider and smoother and stays clear all summer. This is not a written rule, it is not posted on any signs, and often not even verbally communicated. It is a rule, learned by example, as newcomers watch others perform this ritual and then follow their example. Some people only move one rock, others many. It doesn’t matter, really, every rock can make a difference - whatever each person can contribute is welcomed. It is an easy idea, as you are walking, make the path a little bit easier for the next person coming along. It seems to me that this is where we are at as women in STEM. Pioneers, both men and women, have made a path, they have put in a great effort and as a result we are able to travel along much further in our careers, where in the past it was really hard slogging. But for many the path is still a bit narrow, and there are still some stumbling blocks that wash in. If everyone along the path - newcomers and old hands alike – would, in their own way, help to “remove the rocks” through outreach, mentoring, supporting diversity policy development, awareness raising and advocacy the path would grow wider, and more people would be attracted to the wide opportunities offered in these careers. Every volunteer, every mentoring conversation, every girl engaged, every woman encouraged makes a difference in STEM.

The reports in this book tell the rest of the story. The work done and the outcomes achieved are outstanding. I have learned much from this network about the goodness and willingness of people to help, to make change, to show up and to pitch in. I have learned about the value of invitation, of the space to be heard, the wonders of the collective, and importance of the personal. Thank you to everyone involved – I remain in wonder and gratitude.

Sincerely,

Elizabeth Croft
NSERC Chair for Women in Science and Engineering, BC/Yukon Region, 2010-2015
AC KNOWLEDGEMENTS:

WWEST Partners is part of the WWEST program, part of Dr. Elizabeth Croft's 2010-2015 NSERC Chair for Women in Science and Engineering for BC and Yukon. The inspiration for this program came from the previous Chairholder, Dr. Anne Condon, who lead a similar program called the Jade Project.

WWEST Partners would not have been possible without the work and dedication of many people, including the WWEST Partners selection committees and the WWEST team, notably Heather Gerrits, Kyle Philibert, Justin Yang, and Janet Fraser.

This book is a compilation of the work of many authors. Each summary draws heavily on the reports we received from our WWEST Partners. Thank you to Adam Jelley and Brie Sommerville for their assistance in drafting and editing documents.

We would also like to acknowledge the sponsors of the 2010-2015 NSERC Chair for Women in Science and Engineering for BC and Yukon – without their support, WWEST would not be possible:

Natural Sciences and Engineering Research Council of Canada
Faculty of Applied Science at the University of British Columbia
BC Hydro
WorleyParsons
Teck
Stantec
Dr. Ken Spencer
Henry F. Man
Ms. Catherine Roome
Mr. Stanley Cowdell
Division for the Advancement of Women in Engineering and Geoscience
Nemetz (S/A) & Associates Ltd.
Glotman Simpson Consulting Engineers
Karen Savage, P.Eng.
Golder Associates Ltd.
WHAT IS WWEST PARTNERS?

WWEST Partners is a funding program, training program, and community of practice that brings together both new and established not-for-profit organizations from BC and the Yukon that share a common goal: advancing gender diversity in science and engineering.

When Westcoast Women in Engineering, Science, & Technology (WWEST), the program of Dr. Elizabeth Croft’s NSERC Chair for Women in Science and Engineering for the BC and Yukon Region, began in September 2010, the region already boasted a huge number of non-profit and institution-based groups that had expertise, name recognition, contacts, and people passionate to help. It was clear that the most effective way to deliver meaningful, community-centered programming was to support and grow the success of these organizations.

Established in early 2011, WWEST Partners helped community members to learn, share, and disseminate best practices and build towards the long-term sustainability of their respective programs. WWEST provides targeted training opportunities, seed funding, and expertise.

WWEST Partners programs target all levels of outreach, and all areas of the region, providing broader, sustained, and community-based impact. Seed and expansion funding agreements are one to three years in length, and range up to six thousand dollars per project.

THE IMPACTS AND BENEFITS OF THE WWEST PARTNERS PROGRAM

“Support from the WWEST Partners program allowed All-Girls Science programming in the Yukon to flourish. It was important for our program to have connection to the wider community. Thank you!”
- Heather Dundas, Coordinator, Science Adventures, Yukon College

The WWEST Partners program has benefitted the BC and Yukon region in several significant ways. First, the program itself has supported key grass-roots, community-based organizations. Second, it has created a culture of cooperation and support linking these groups together. Third, it has provided the necessary seed funding to start new programs or grow successful programs to reach a wider audience.

The BC and Yukon region contains a few densely-populated areas where the vast majority of the population lives, and hundreds of smaller communities, many of them quite remote from the major centres. Different areas have unique needs, and organizations already situated in these areas have connection, understanding, and day-to-day presence that is impossible to duplicate through a distant program, even with visits to the area. Investing in WWEST Partners invests in communities, organizations, and people, and ensures programs are sustainable year-round and well into the future.

Finding like-minded organizations, sharing best practices, and developing collaborations can be daunting, if not impossible, for smaller not-for-profit groups, particularly those that are entirely reliant on volunteers. WWEST Partners made this easier, encouraging groups to get connected, providing targeted training opportunities, and providing incentives for collaboration.

Some organizations that are not affiliated with a university or are located outside of a major urban centre experience additional barriers. Providing travel funding allowed them to fully participate in WWEST Partners training and networking events, and ensured they felt supported.

Groups that previously had relatively small regular audiences are working together to co-present events, broadening their impact. For example, two WWEST Partners that typically reached less than twenty participants each partnered with a group which had not previously offered women in STEM programming, selling out an evening talk with one hundred participants.

The most direct impacts of WWEST Partners were the work of the Partners themselves. Each organization advanced women in science and engineering in their community, based on the needs they observed or experienced. This book tells their stories.
BUILDING SUSTAINABILITY

The WWEST Partners program was designed to ensure sustainable funding model. Although individual funding structures were based on the needs of each group, partners were encouraged to consider multi-year funding agreements that diminished over time.

The multi-year agreements provided the initial capital needed to start a program, a reliable base of support on which to grow and, as the amounts diminished over time, compelled partners to pursue other sources of funding before the WWEST Partners agreement was complete. The multi-year funding agreements helped organizations plan for long-term success and provided the stability needed to encourage other funders to invest in the projects.

The WWEST Partners model was recognized by non-profits and by local industry as being an effective way of encouraging grass-roots engagement. As such, the program will continue under the 2015-2020 WWEST Program at Simon Fraser University and the UBC Engineering eng•cite program.

THE WWEST PARTNERS PROCESS

FLEXIBLE OPTIONS TO REFLECT THE DIVERSITY OF ORGANIZATIONS

The WWEST Partners program offered three types of affiliation to reflect the needs of the organizations we worked with:

- Affiliates were organizations with aligned goals or programming that did not require financial support from WWEST;
- Funding Partners were organizations with current funding agreements;
- Network Partners were organizations with completed funding agreements.

New funding partners were eligible to apply for New Initiatives funding, which was available for new projects or significant expansions of programs. At the end of their initial funding agreements, organizations were eligible to apply for strategic planning extensions and/or impact measurement extensions.

NEW INITIATIVES

Organizations were able to apply for grants for one to three year grant for new or expanding projects. Single-year projects were eligible for grants up to $5000; multi-year projects were eligible for grants totaling up to $6000.

The intention of the funding was to help establish or expand programs, and it was expected that projects had matching funds from other sources and a plan for continuation after WWEST Partners funding ended. Projects were only eligible for funding once.

STRATEGIC PLANNING EXTENSIONS

Organizations that had previously completed WWEST Partners agreements were eligible to apply for a Strategic Planning Extension. These extensions, of up to $1000, were available to support organizations which were undertaking strategic planning to increase their organizational capacity and readiness to continue their projects. They were not general extensions for the programs; well-developed, detailed proposals and timelines were expected for applications in this category.

IMPACT MEASUREMENT EXTENSIONS

Organizations that had previously completed WWEST Partners agreements were eligible to apply for an Impact Measurement Extension. These extensions, of up to $2,000, were available to support organizations which were undertaking significant research to measure the impact of their projects, such as implementing widespread, literature-informed evaluations, or designing and validating a measurement tool. Well developed, detailed
proposals and timelines, along with an outline of the approach to research and the credentials of those participating in the process, were expected for applications for this category. Project results must be public, and methodologies and tools must be licensed at no charge for non-profit education sectors (e.g. available in a public access journal).

ELIGIBILITY

Funding was restricted to non-profit organization with a registration that is recognized in the BC/Yukon Region, and educational institutions. Groups that could not meet this requirement were encouraged to collaborate with groups that did.

The WWEST Partners program was specifically designed for programs with a broad impact. Funding for teams, participation in conferences, and other individual pursuits was not available.

Organizations could apply for multiple projects, and projects could apply for multiple categories.

NOTIFICATION OF INTENT TO APPLY

Each year, WWEST sent out a call for proposals. Interested organizations were asked to submit a one page abstract that outlined their organization and their proposed initiative. All organizations that submitted abstracts that met the basic requirements for the WWEST Partners program were invited to our annual training and networking day.

WWEST PARTNERS TRAINING DAY

The WWEST Partners training days included a workshop on a topic relevant to the WWEST Partners organizations, formal and informal networking opportunities, and abstract reviews.

During the lunch hour, each organization has a private discussion with WWEST representatives about their abstract, where they discuss their goals and receive feedback before final proposals are due. This helped less-experienced Partners improve their applications before they are sent to the review committee. It also helped WWEST to identify areas of overlap early, allowing us to suggest collaboration or coordination.

APPLICATIONS AND SELECTION

Applications were free-form, and restricted to three pages plus appendices. Each application contained a summary of the organization applying, a summary of the project, the need for the project, and the impact of the project. Appendix I was detailed budget; Appendix II and Appendix III were specifically for extensions, covering milestones and approaches.

Project selection and funding was based on recommendation from a review committee, which included members from industry, the not-for-profit community, and academia.

Project selection was based on:

- The need for the project, including geographic and sector considerations;
- The impact the project would have and the number of people affected;
- The sustainability of the project after the funding ends, including organizational capacity;
- Organizational readiness for the funding;
- Appropriate plans for how the project will be meaningfully measured and plans for dissemination of results;
- Other factors were sometimes considered to ensure diversity in funded applications.
PROJECT IMPLEMENTATION

WWEST Partners were responsible for all project implementation. Many Partners pursued at least part of their project in cooperation with Partners doing similar activities in a different area. WWEST was available for advice or assistance upon request.

REPORTING

WWEST Partners reported on their progress yearly, with a final report due at the end of the project. These reports form the basis of this publication.
WHAT IS WWEST?

Westcoast Women in Engineering, Science & Technology, commonly referred to as WWEST, is the operating name for the programs of the National Sciences and Engineering Research Council of Canada (NSERC) Chair for Women in Science and Engineering for the British Columbia and Yukon Region.

WWEST opens doors and invites girls, women, and everyone else to engage with STEM: science, technology, engineering and math. Through policy advocacy, research, and grassroots outreach, WWEST aims to attract and retain women in STEM careers.

OUR MISSION:

The mission of the Chair is to advance engineering and science as welcoming careers that serve our world through holistic understanding and creative, appropriate and sustainable solutions.

OUR GOALS

The primary focus of the NSERC Chair for Women in Science and Engineering (BC/Yukon) is to promote Science and Engineering as an excellent career choice for women and other under-represented groups, and to identify and eliminate barriers that result in attrition from these career paths. To address the challenges described above, three strategic thrusts for this Chair, aligned with the overarching NSERC goals for this program, are identified:

1. Awareness and Outreach
2. Recruitment
3. Retention and Industry Support

OUR HISTORY AND FUTURE

WWEST was founded by the 2010-2015 NSERC Chair for Women in Science and Engineering for BC and Yukon, Dr. Elizabeth Croft at the University of British Columbia.

The WWEST brand will remain with the NSERC Chair for Women in Science and Engineering for BC and Yukon, under the new 2015-2020 Chairholder, Dr. Lesley Shannon at Simon Fraser University.
THE WWEST PARTNERS
ACADEMIC BRITISH COLUMBIA WOMEN IN ENGINEERING GROUP (ABCWiE)

ORGANIZATIONAL SUMMARY

The women in engineering groups of Simon Fraser University (SFU), University of British Columbia (UBC), British Columbia Institute of Technology (BCIT), and Langara College formed an inter-university collaboration called the Academic British Columbia Women in Engineering (ABCWiE) in 2011.

The UBC Women in Engineering (WiE) program creates opportunities for students to network with peers and industry professionals while enhancing professional competencies through a myriad of workshops and events provided by the Faculty. SFU Women in Engineering Group (WEG) offers guidance in the transition to university life, support throughout university, and assistance in navigating post-grad job opportunities. BCIT and Langara also host women in engineering groups where students connect through professional development, social, and outreach events, and promote engineering education and careers to women. Spearheaded by individual student councils, these four WiE programs serve over one thousand women undergraduate and master's students at all four institutions.

ABCWiE aims to build a strong technological community and support network as well as share resources on the Canadian West Coast. Collaboration between WiE groups help to broaden and enhance support networks for women students and increase opportunities for informal mentoring. This regional support network beyond their home institution aims to help students who transfer institutions mid-degree, work in a co-op position in another area of BC, pursue graduate studies at a different institutions, or those who wish expand their network to students at other institutions.

ABCWiE facilitates social, networking, company visits, and professional development WiE events open to students from any institution offering engineering courses in British Columbia.

For more information visit www.wie.engineering.ubc.ca/committees
ABCWiE organized a three day trip for 28 students, with preference given to women, to visit top technical companies in Seattle in 2012. The purpose of the trip was to introduce students to post-graduate opportunities and challenges, as well as allow them to experience firsthand the scope of their field. Students visited many areas on the trip, including the University of Washington’s BioRobotics lab and Boeing, where they enjoyed a guided VIP tour of the factory and manufacturing process. At the Museum of Flight, they were inspired by Concorde, Air Force One, and NASA’s Super Guppy among other famous aeronautical engineering designs. Finally, students were given a tour and speaker panel on career development and work-life balance at Microsoft.

A few months before the trip, ABCWiE also organized a “Design and Desserts” event aimed to introduce trip participants to each other and strengthen bonds between students. The evening of interactive, team-building activities offered art canvases, easels and paints as well as dessert and non-alcoholic drinks. Students were invited to collaboratively paint on each of the 15 canvases, creating artwork together as a way of getting to know one another.

The trip succeeded in introducing students to post-graduate opportunities and challenges of their field, gave potential employers a chance to connect with future employees, and provided students (from all schools) an opportunity to network with likeminded students in their field and widen their support network.

The trip was very well received, and scored a 4.2 on a scale of 5 for overall satisfaction. The feedback showed that the trip exceeded many expectations, particularly the chance for students to explore their fields, and for potential employers to connect with future employees.
BITFIT ONLINE PROGRAMMING PRACTICE & LEARNING TOOL AT THE UNIVERSITY OF VICTORIA DEPARTMENT OF COMPUTER SCIENCE

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $2,000

Project undertaken by: Dr. Yvonne Coady, Anna Russo-Kennedy, and Anthony Estey

PROJECT SUMMARY

Recent results show that only one in 10 organizations in Canada are able to meet critical needs in emerging areas such as data science, mobile and cloud computing. Forecasts indicate that by 2016, the Canadian economy will be short over 100,000 technology specialists, and in a decade there will be 1.5 million tech jobs unfilled. Computer Science struggles to retain undergraduate students, especially from underrepresented groups. As a result, Dr Yvonne Coady at the University of Victoria’s Department of Computer Science began to develop strategies for active mentoring and intelligent tutor systems for students called the BitFit.

With WWEST funding support, the University of Victoria were able to complete the development and begin the evaluation of an enriched online educational opportunity that is now available for multiple institutions.

Specifically, this tool was designed for students who are new to technology, and offers additional support for learners to assess their own progress as they engage in hands-on activities with an intelligent tutor framework. When students use the tool, it gathers data about how they interact with it, and it is used to encourage active participation with the course material. Preliminary research that went along with the development of BitFit suggests that using BitFit or similar tools could improve students’ experiences in introductory programming courses.

BitFit, has been showcased at the Learning and Teaching Centre at UVic, and was the centrepiece of both a Master’s and PhD thesis. The framework was created by Anna Russo-Kennedy (MSc Student) and Anthony Estey (PhD student).

For more information contact Dr. Yvonne Coady at the University of Victoria
CANADIAN UNDERGRADUATE MATHEMATICS CONFERENCE (CUMC)

ORGANIZATIONAL SUMMARY

The annual Canadian Undergraduate Mathematics Conference is Canada’s premier conference for undergraduate students in mathematics-related fields. The conference, first organized in 1994, gives undergraduate students the opportunity to present their own research projects, listen to keynote speakers, and mingle with other students who share their passions for mathematics.

The core values of CUMC are:

- Bilingualism
- Regional diversity
- Non-competitiveness

Each year during the conference, student representatives from across the country select the upcoming host based on presentations from student committees. The successful committee then organizes all logistics of the event, including fundraising and hosting the full conference.

For more information visit www.cumc.math.ca
The 2012 CUMC was held at UBC’s Okanagan campus in Kelowna, BC, where the 3rd annual CUMC Women in Mathematics dinner took place. The theme of the night was “Breaking Down Barriers: Challenges Facing A Female Mathematician.”

An evening for women faculty and students, the dinner hosted 44 guests and included an hour-long panel discussion with 5 prominent women in academia and industry. The evening began with a round table discussion, held in the Centre for Dialogue in the newly renovated Library at Okanagan College, where panelists from both industry and academia had the chance to share their experiences and discuss a range of topics. Dinner was served outside in the Courtyard in the beautiful Kelowna sunshine. During dinner, the participants and panelists mingled and continued their conversations.

“Our objective is to bring women in mathematics-related careers together with female math students, to share their experiences in surmounting the challenges faced by women in science.”
CREATING CONNECTIONS

ORGANIZATIONAL SUMMARY

Creating Connections is a bi-annual conference for science, engineering and technology students and professionals. The conference covers topics on gender diversity and aims to engage meaningful dialogue about diversity in science, engineering and technology disciplines. This in turn builds capacity for individuals and organizations to engage in transformative and long-lasting change in STEM fields.

This conference began as a symposium and has now grown into four bi-annual conferences gaining audiences of hundreds of STEM professionals, academics and students. The audience includes people of all genders, people in career transition, managers and human resource professionals, and members of the wider community. UBC Engineering and WWEST 2010-2015 organized the first three conferences in collaboration with industry and academic partners. The first conference was held at Loon Lake in Maple Ridge in 2009, with the following two conferences hosted at UBC Vancouver.

Creating Connections 4.0 was hosted at Simon Fraser University. Simon Fraser University engages actively with the community in its education and research, delivers almost 150 programs to more than 30,000 students, and has more than 120,000 alumni in 130 countries. At SFU, efforts to encourage and support outstanding teaching, research and community engagement by advancing gender and racial equity in STEM fields span all three campuses and illustrate SFU’s vision of a “student-centred, research-driven, and community-engaged university.” SFU has always supported women in science and technology. This includes: recruiting successful women faculty as leaders and role models in science and technology; creating positions that promote diversity and recruitment; developing new policy guidelines for supporting women students who take maternity leave during their graduate studies; and outreach programs that introduce girls to science and technology. Additionally, SFU was successful in their application for Dr. Lesley Shannon to be the new NSERC Chair for Women in Science and Engineering for the BC/Yukon region.
Creating Connections 4.0 was hosted by SFU on May 22-23, 2015 with the aim to bring together people of all genders and backgrounds for two days to discuss issues of personal and professional development, networking, and inspiration. The hope was to engage individuals and organizations to create a world where everyone can explore and participate in the opportunities provided by engineering, science and technology to improve our world.

The conference began with the announcement of two new NSERC Chairs for Women in Science and Engineering: Dr. Lesley Shannon for the BC/Yukon region and Dr. Eve Langelier for the Quebec region. Creating Connections 4.0 featured a new Leadership and Diversity track, which was aimed at leaders/managers as well as self-identified future leaders in industry. To provide attendees of this track with information and best practices on creating a diverse workforce, sessions included a keynote on “The Business Case for Diversity.” This Friday session drew 61 professionals (10% men, 90% women) who took part in hands-on workshops such as “Strategic Recruiting: Values-Guided Hiring” and “Insightful Leadership.”

Saturday’s sessions focused on professional development in three areas: Leadership Skills, Entrepreneurship, and Women in STEM Outreach. Three workshops were offered on each subject along with three inspiring keynote speakers, including five-time Olympic medalist Hayley Wickenheiser. Over 170 attendees (10% men, 90% women) participated in the conference on Saturday, including 36 students who were sponsored by SFU, UBC, BCIT and Creation Technologies. Also offered on Saturday was the Creating Connections Kids Program, run by SFU’s Science Alive Outreach program, which featured supervised fun and exciting activities for school-aged children to keep them engaged and cared for during the conference.

The conference was successful in bringing together people from a variety of backgrounds for inspiring discussions about diversity in engineering, science and technology. The sessions allowed for valuable networking and professional development.
ORGANIZATIONAL SUMMARY

The UBC Chapter of Engineers Without Borders (EWB) is active throughout campus and includes members from all engineering disciplines as well as other faculties. Work within Canada includes holding a youth outreach leadership conference as well as numerous presentations in high schools. EWB also runs a Global Engineering program which includes student directed seminars and a first year engineering curriculum course.

The Youth Venture’s purpose is to prepare and better educate young people about the problems that face the world today through challenging pre-conceived assumptions about international aid, social development, local vs. global poverty, and the role that engineers play in the world.

EWB highlights the importance of the social aspects of engineering and sciences through workshops, presentations and conferences.

For more information visit www.ubc.ewb.ca
On March 28th 2015, EWB hosted a Youth Venture conference for 25 students (6 women students and 19 men) at the UBC Vancouver campus entitled *It’s Our Energy!* The event featured a series of workshops and presentations on the theme of renewable energy, and how engineers are tackling its complex technical and social problems.

Guest speakers were invited to discuss renewable energy initiatives, both local and international, considering the pros and cons of the available methods. One presenter was the UBC Engineers for a Sustainable World Biodiesel project, which produces biodiesel from waste cooking oil for the UBC community. The event also hosted a design competition where students were tasked with building a small-scale wind turbine using just a motor and simple building materials. Designs were completed in teams, and required students to use their critical thinking skills.

The feedback received from the students was positive, with many saying they learned a great deal about sustainability in engineering and enjoyed working on their critical thinking skills in small groups. They also learned about the importance of the social aspects of engineering and that the field involves more than technical skills.
ORGANIZATIONAL SUMMARY

Geering Up UBC Engineering & Science for Kids is a non-profit, student-run organization dedicated to promoting science, engineering and technology to the children and youth of British Columbia through fun, innovative and hands-on experiments and projects. GEERING up! strives to reach all children and youth regardless of gender, ethnicity, culture, or socio-economic status, with special outreach for those groups traditionally underrepresented in the sciences.

Geering Up delivers STEM outreach programming for youth from kindergarten to grade twelve. It also offers special outreach programming for groups traditionally underrepresented in STEM, including girls, Aboriginal youth, and at-risk youth.

Geering Up is an entirely student-run program, and has reached over 90,000 youth British Columbia since it was founded in 1995. It has three main branches of programming: fall and spring after-school clubs, in-school workshops during the spring, and Summer Camps in July and August.

From 2011 to 2013, WWEST provided a 3-year grant enabling Geering Up to expand their Girls Only! programming. Girls Only! initiatives included providing workshops to Girl Guides clubs as well as offering a Girls Only! week of camp at the Vancouver campus to empower and inspire girls to consider careers in the fields of science, engineering and technology.

In 2015 alone, Geering Up reached 6,150 youth in workshops and 2,600 youth in camps. This impact reached 17 communities across BC, including Metro Vancouver, Hope, Chilliwack, Prince George, Tsleil-Waututh and Musqueam Nations, Penticton and Kelowna.

Geering Up has grown in capacity since partnering with WWEST in 2011, hiring 45 staff members for 2014/2015, training 150 summer high school volunteers, and running 113 weeklong day-camps between July and August 2015. Their after-school clubs continue to expand, offering five at UBC-Vancouver in fall 2015 and spring 2016.

For more information visit www.geeringup.ca
PROJECT SUMMARY:
GIRLS ONLY! CAMPS & WORKSHOPS

WWEST PARTNER FOR: 2011-13
GRANT VALUE: $6,000

WWEST’s 3-year funding for Geering Up supported three strands of programming:

- 2011-2012: Free workshops for Girl Guides of Canada
- 2011-2013: Girls Only! Camps
- 2013: Free workshops at Boys and Girls clubs and inner city schools

The funds supported free workshops to 233 girls through the Girl Guides of Canada. The workshops enabled Sparks, Brownies and Guides to achieve badges as part of the curriculum. In 2013, 49 (one third) of all Geering Up workshops were offered for free in Vancouver and Boys and Girls clubs, or at inner city schools.

Geering Up Girls Only! Camps create a comfortable learning environment for girls to explore their potential and build confidence in STEM fields. In the summer of 2011, Geering Up reached 67 girls through its Girls Only! Camps, 75 girls in 2012, and 87 girls in 2013.

Through interactive and hands-on sessions, girls were exposed to the multifaceted nature of STEM. Participants also interacted with women in STEM mentors, staff and volunteers.

The curriculum for these camps and workshops were developed by Geering Up instructors and covered topics including: Rube Goldberg Machines, hovercrafts, strawberry DNA extraction, squid dissections, and VEX robots.
The Geering Up Girls Club, called Geer Gals, was a unique opportunity to work closely with 23 girls throughout an entire school semester. The programming is designed to increase girls’ exposure to and engagement with science, engineering and technology. The funding provided by WWEST allowed Geering Up to run their first Girls Only club. The project was extremely popular and led to increased club offerings in the following spring. Thanks to WWEST’s support, after school clubs have become a permanent part of Geering Up programming.

Instructors

commented that the long time span of this program allowed them to create a deeper connection with the participants. This project has allowed the Geering Up Girls Only program to offer more girls a safe place to discover, learn and gain interest in STEM fields.

Extensive one on one instruction was possible through eight three-hour sessions, to a small and engaged group of elementary school girls. Topics ranged all across engineering and science, and allowed the girls to explore the topics and follow their passions. The project allowed girls to experience different facets of STEM, receive mentorship, and feel connected to likeminded peers.

Geering Up plans on continuing expanding its Girls Only clubs in fall 2015 and beyond. In 2015 Geering Up hopes to offer two age brackets of Girls Only clubs at UBC Vancouver campus, while continuing to offer Girls Clubs with the Vancouver School Board.
PROJECT SUMMARY:

GEER GALS CLUB – LEGO MINDSTORMS EQUIPMENT EXPANSION

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $2,500

In 2015, Geering Up was able to offer the Girls Club program a unique opportunity: exploring the field of robotics through LEGO Mindstorms. Using WWEST funding, five LEGO Mindstorms kits and the required software were purchased to enhance the curriculum of the after school club. The Mindstorm kits are designed for imagination and exploration, as students can build and program LEGO robots to complete a variety of tasks.

The Girls Club ran for eight three-hour sessions for girls in grades 8-9. Weekly topics ranged across STEM disciplines, with the LEGO Mindstorms being a particular success. Geering Up instructors witnessed the girls acquiring skills and confidence throughout the program, which they can carry into their communities at school and home.

The new equipment allowed the girls to have more time to work with technology and computers, which would not be possible with Geering Up's past store of equipment and resources.
PROJECT SUMMARY:

GIRLS CLUB WITH THE VANCOUVER SCHOOL BOARD

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $3,250

In January 2015, 20 students from Lord Roberts Elementary School, grades 4-7, were invited to attend Geering Up’s Girls Club, in partnership with the Vancouver School Board.

The program ran for 8 weeks, from January 14 to February 25, 2015 at the school, with the students enjoying 1.5 hour sessions every week.

Activities during the program included:

- Squid dissection - Topics included biology, body systems, and aquatic life. In pairs, the girls were guided through a dissection and were challenged to find the tiny "beak" of their squid.
- Lego Mindstorms - Subjects included robotics, basic programming, mechanical and electrical engineering.
- Egg drop design challenge - Instructors discussed the engineering design cycle, budgeting, and teamwork.
- Electromagnets - Instructors lead an activity in which the girls used nails, wires, and batteries to magnetize the nails. They tested them on paper clips!
- Snap circuits & breadboarding - Exploring parallel, series circuits with both snap circuits as well as LEDs and resistors.

Staff reported that the students were very engaged and enjoyed exploring a wide variety of STEM topics. The squid dissection in particular started off with many girls being wary of the "gross-ness", but by the end they were all getting their hands dirty.
PROJECT SUMMARY:

GIRLS ONLY KELOWNA CAMPS

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $2,500

Using the WWEST funding, Geering Up launched two Girls Only! camps for one week in Kelowna, BC. The Quarks, grades 2-4, had 22 participants, and the Electrons, grades 5-7, had 11 participants.

The curriculum for the camps included:

- Egg drop design challenge (+ parachute for Electrons). Instructors discussed gravity, drag/air resistance, and impact
- Bouncy balls/slime. Instructors discussed polymers, plastics, 3D printing and materials engineering
- Magic Milk - food colouring and soap diffusion experiment. Instructors discussed surface tension, currents, and equilibrium
- Marbled nailpolish art. Instructors examined the ingredients in nail polish (adhesive polymers, plasticizers, pigments, thixotropic thickeners, ultra violet filters, solvents...), and continued the discussion of diffusion and surface tension
- Baking soda/vinegar volcanoes. Focus on earth science & types of volcanos
- Ooblek bucket. Instructors discussed non-newtonian fluids, density and states of matter
- Borax crystals
- Chemistry demonstrations with a mentor from the chem department
- Snap Circuits
- Bottle cap motor bugs
- Fire in a bottle
- Catapults
- Bath bombs
- Alka seltzer film canister rockets

The Kelowna camps included a local team of Kelowna-based instructors and administrator, which helped strengthen ties to the local communities.

Plans are already in place to continue offering Girls Only camp in Kelowna in 2016.
Geering Up is pleased to note that 43% of participants they reached in 2015 were girls: over 900 campers, and 2,850 workshop participants. To bolster their reach to girls, Geering Up offers “Girls Only!” programming in both its After-School Clubs as well as its Summer Camps. These programs provide a different atmosphere than their co-ed counterparts; however, the curriculum that is delivered is the largely same.

Geering Up has been delivering “Girls Only!” programming for years, and has collected lots of anecdotal evidence that it has been successful, but has yet to do a quantitative analysis on the benefit of running single-gender programming. They began looking into companies to do an overhaul of their camper survey system, as well as investigating options for longitudinal studies.

After examining a variety of options they found that they needed a general consultation before they went further. As such, a company was hired to do an overview of their surveying system, and to suggest tips on how to generate useful data. The changes will be implemented in the fall of 2015, with two of the after-school clubs: the GeerGals (grade 4-7 “Girls Only”) and GeerBots (grades 4-7 co-ed).

Geering Up will continue to pursue deeper quantitative analysis of the benefit of our programming, once the results of the consultation have been received.
Gendered Words in Canadian Undergraduate Engineering Recruitment Program (GWERP) was a collaboration between UBC Mechanical Engineering and UBC Sociology targeting the gender imbalance that persists in engineering. GWERP aims to address the imbalance and to increase the number of women applying for engineering programs. The preliminary paper was presented at the 2015 Canadian Engineering Education Association Conference.

**PROJECT SUMMARY**

GWERP examined the use of gendered words in Canadian undergraduate engineering recruitment materials from all English-language engineering faculties, schools and programs. The program performed content analysis, checking frequency of words that have been previously identified as masculine and feminine in job advertisements. The researchers then compared the results with the enrolment data of each school, while controlling for other factors that may influence an applicant’s choice.

**PROJECT FINDINGS**

**By School:**
- More masculine words by school (both unique words [21:17], and total instances [410:256])
- A negative correlation between the fraction of feminine words to total words and women enrolled
- A positive correlation between the percentage of female faculty and the fraction of masculine and feminine words to total words

**By Discipline:**
- Disciplinary differences in percentage of women (from 8% for Computer Engineering to 37% for Biosystems Engineering)
- More masculine words by discipline (both unique words (16:10), and total instances (149:67))
- No correlation between proportion of female and male words and the number of women enrolled.
Girl Guides of Canada is the largest organization for women and girls in Canada.

The membership is organized into different groups according to age. These are Sparks (ages 5 and 6), Brownies (ages 7 and 8), Guides (ages 9 – 11), Pathfinders (ages 12 – 14), and Rangers (15-17+).

For more information visit www.girlguides.ca
PROJECT SUMMARY:

SPIRIT OF ADVENTURE RENDEZVOUS (SOAR) CAMP - ENVIROSTEM PROJECT

WWEST PARTNER FOR: 2011
GRANT VALUE: $2,600

WWEST Partners funding supported STEM activities at the BC Girl Guides’ Spirit of Adventure Rendezvous (SOAR) 2011 Camp held in Agassiz, BC. This camp offered seven Environment programs, with eight STEM activities that engaged Guides, Pathfinders and Rangers (girls aged 9-17) in hands-on science, engineering, technology and math activities. The objective was to provide fun and safe experiences for the girls to learn, think, and work as teams. The objective of SOAR EnviroSTEM was to create experiences for Guides, Pathfinders and Rangers to engage girls in hands-on science, engineering, technology and math activities, and provide fun and safe experiences for them to learn, think, and work as teams. Specifically the goals were to:

- Provide girls attending SOAR 2011 with program activities in the areas of environment, science, technology, engineering, and math;
- Encourage positive female role models in these areas;
- Take science “out of the classroom” and encourage fun, non-school-like, exciting and experiential activities and field trips; and
- Inspire girls to do further education and/or pursue careers in scientific fields.

Eight STEM programs were offered as part of the project, including: Crazy Chemists, which saw students engaging in simple chemistry experiments, such as Rockin’ Robots where the kids were given the opportunity to build an hydraulic robot.

The program was fantastically successful, meeting all of the team’s objectives, and even picked up media coverage as a result. Leaders reviewed all activities and made recommendations for future SOARs. Some materials from the activities were re-used throughout the year at other BC Girl Guide events. Plans were also made to work with the BC Training and Program committees to incorporate use of STEM activities into Guiding events.

“I think I would like to work at [the UBC Dairy Research Centre] when I get older”
Girls Exploring Physics is a free workshop for girls in grades 9 and 10 held at the SFU Burnaby campus.

The half-day workshops include hands-on activity sessions in physics for girls to explore their interest in the subject. The programme also arranges for the girls to meet women scientists to discuss their career paths and advice for the students. Workshops can include tours of the new Trottier astronomical observatory.

For more information visit [www.sfu.ca/physics/outreach](http://www.sfu.ca/physics/outreach)
PROJECT SUMMARY:
GIRLS EXPLORING PHYSICS WORKSHOPS

WWEST PARTNER FOR: 2011-13
GRANT VALUE: $2,800

This program of free workshops was run by the Simon Fraser University Department of Physics for girls in grades 9 and 10. The objective was to encourage high school girls to take Physics 11 and Physics 12, and to continue to study physics at university, as many girls drop physics at this transition. WWEST Partners funding has supported the two workshops offered each year between 2011 and 2013.

Each half-day workshop had two hands-on physics activities: Exploring Physics Through Candy and LED’s - Lighting for Efficiency and Drama. There was also a discussion of the career opportunities with students who study physics at the university level.

During the free lunch, participants had the chance to interact informally with SFU women physics faculty and students, as well as with their fellow participants. Up to forty-eight girls attended each workshop, with participants travelling to Burnaby from as far away as the Sunshine Coast and Langley.

Participants were surveyed after each workshop to assess the success of the activities, and, for example, of the girls who attended in Fall 2013, 46/48 (96%) stated that they learned something new.
ORGANIZATIONAL SUMMARY

IEEE Women in Engineering (WIE) is the largest international professional organization dedicated to promoting women engineers and scientists.

IEEE WIE attempts to:

- Recognize women’s outstanding achievements in electrical and electronics engineering through IEEE Awards nominations;
- Organize receptions at major technical conferences to enhance networking and to promote membership in WIE;
- Advocate women in leadership roles in IEEE governance and career advancement for women in the profession;
- Provide assistance with the formation of new WIE Affinity Groups and support ongoing activities;
- Promote IEEE member grade advancement for women to the membership grades of Senior member and Fellow;
- Facilitate the development of programs and activities that promote the entry into and retention of women in engineering programs;
- Administer the IEEE Student-Teacher and Research Engineer/Scientist (STAR) Program to mentor young women in junior and high schools.

WWEST Partners funding has supported the Vancouver Section’s STAR program (Students, Teachers and Research), a pre-university outreach initiative, and networking events for their members.

For more information visit www.ieee.org
The mission of IEEE WIE was to inspire, engage, encourage, and empower women in engineering, and work toward a vibrant community of IEEE women and men to innovate the world of tomorrow. For 3 consecutive years, WWEST Partners funding has supported the Vancouver Section’s STAR outreach program (Students, Teachers and Research), a pre-university outreach initiative, and networking events for their members.

Events have included:

- **TRY Engineering University Field Trip and Lab Session**
  In April 2011, grade 10 and 11 students from University Hill Secondary School visited the electrical and computer engineering (ECE) program at UBC. The students toured the robotics lab, attended an ECE undergraduate student teams project showcase, carried out a hands-on electronics lab project, and had the chance to talk with undergraduate students.

- **Networking Night with Amazon**
  In October 2013, WIE members learnt about Amazon’s services and products, hiring process, employment criteria, and working environment. The participants created connections with the Amazon employees, recruiters, and other WIE members.

- **“Meet an Engineer” Classroom Visits**
  Four classroom visits were held in conjunction with the Planning 10 class at University Hill Secondary School. For each visit, a woman engineering graduate student or engineer in training led a classroom activity to safely transport potato chips using only the supplies provided. Student surveys undertaken before and after the event showed an increase in interest in engineering, and increased knowledge about high school requirements for engineering.

85% of the high school students who were previously unaware of the requirements to get into a post-secondary engineering program learned them during the classroom visit

22% of the students who previously uninterested in engineering, changed their minds after meeting an engineer
LEADERSHIP THROUGH DIVERSITY (LTD)

ORGANIZATIONAL SUMMARY:

Leadership Through Diversity (LTD) is a student-run group that aims to provide engineering students a chance to get involved in leadership-building opportunities, develop skills and have fun in an inclusive environment without having to commit a large amount of time throughout an entire semester, like many of the other groups on campus. It aims to help students to gain leadership skills, promote self-development, and increase involvement in faculty-related events and socializers. Events held are also tailored to allow participation from anyone in engineering.

LTD focuses on 3 main principles:

- Anyone in the faculty of engineering can get involved. You don't have to self-identify as “diverse” in order to participate. LTD provides leadership opportunities for everyone in the group without carrying heavy commitment weights.
- All events organized do not revolve or focus on alcoholic/drinking events or getting drunk. The group strives to make everyone feel included and there is no pressure to conform to the drinking crowd.
- LTD especially focuses on encouraging women enrolment and retention in engineering. Many schools across Canada have long-running Women in Engineering (WIE) or Women in Science and Engineering (WISE) groups that have seen success through women-focused leadership-building events.

The idea of operating a student-run group focused on women within the Faculty of Engineering at UVic first came into existence after the founder Tiffany Yu attended the National Conference for Women in Engineering (NCWIE) in November 2011, hosted by McMaster University. The conference provided amazing opportunities to network and discuss ideas between female leaders from different student societies and post-secondary institutions across Canada. Inspired by those who were making a difference, the idea of LTD was born and started running by 2012.

At that time, neither the Faculty of Engineering nor the Engineering Students’ Society provided any services that catered to diversity or women in engineering. An executive position called “Coordinator of Student Relations” was started in Fall 2010 for this purpose and helped lead to the creation of LTD.

For more information visit www.onlineacademiccommunity.uvic.ca/ltd
PROJECT SUMMARY:
LEADERSHIP THROUGH DIVERSITY NETWORKING EVENTS

WWEST PARTNER FOR: 2012
GRANT VALUE: $200

In 2012 WWEST Partners funding supported the eight LTD events, three Ladies’ Nights, two Inspirational Speakers, a LAN party, a First Year Workshop, and a Thanksgiving potluck. Over the year there were 235 attendees and each event had positive reviews.

At the First Year Workshop, students found it extremely helpful to get advice and feedback from experienced peers about choosing their engineering department, academics, co-operative work terms, and engineering student life. Instead of a structured lecture, the workshop turned out to be very casual and intimate with participation from all the first years.

The LAN party was run in conjunction with by CSCU (Computer Science Course Union) to promote the togetherness of computer science and engineering students with a night of gaming. Computer science is a separate department not under the umbrella of the Faculty of Engineering, and the students do not often meet. The evening consisted of 3 labs packed full of students playing different games for 2 hours. During the last hour, engineering and CSC split into 2 different teams to battle it out in “Savage”.

The Ladies’ Nights allow all the women engineering students to meet, ranging from 1st to 4th year. One event had a chocolate fountain potluck with everyone bringing fruit and cookies to dip in the chocolate. This was followed by a dance class led by a fellow CSC student. This event was held early in the semester so students had a chance to meet one another and start to form friendships.
ORGANIZATIONAL SUMMARY:
Let’s Talk Science at the University of British Columbia strives to engage young people with hands-on/mind-on activities as a way to improve their understanding and appreciation of physical and life sciences, mathematics, engineering and technology. Founded in 1997, they improve STEM literacy through the outreach efforts of members of the graduate student research community at UBC.

Let’s Talk Science uses creative methods to inspire young people, including those in underserved communities. They provide effective mentoring networks, and give youth the opportunity to learn about science by actually doing science activities themselves, and imagine themselves as scientists.

Many young people, especially women, perceive science as an exclusive, male-dominated field and may not consider it as a viable career choice. Let’s Talk Science counters this through visits from young women science mentors who can challenge stereotypes and open participants to new career possibilities. They also support class projects including those for Science Fairs.

Let’s Talk Science’s outreach work includes:

- Hands-on activities in classrooms such as making rockets, Rube Goldberg machines, slime, and magnetism workshops;
- Bringing students to the UBC campus for special events such as StemCellTalks, the Let’s Talk Science Challenge, and lab tours;
- Rural trips in partnership with Genome BC, delivering genetics themed events to schools throughout British Columbia and the Yukon area;
- Inner-city outreach in partnership with the UBC Centre for Community Based Learning, providing outreach activities in schools across Vancouver’s Downtown Eastside, one of the lowest income areas in Canada.

The impact of UBC Let’s Talk Science’s activities goes beyond the engagement and visits of “real scientists” because they also develop effective activities that teachers may adapt and use in their classes.

For more information visit www.ubclts.com
The Teacher Partnership Program aims to raise awareness and inspire young girls in elementary school to talk and think about science through hands-on activities and classroom visits. In 2015 the program expanded its reach to high school girls; encouraging them to consider studying science at the post-secondary level, and think about careers in science. The program pairs a woman graduate student with a classroom in the Metro Vancouver area to act as a mentor and lead the class in an activity. In 2015, 103 volunteers visited 85 classrooms from K-12, reaching approximately 2600 young people with still more visits scheduled for the remainder of the school year.

“This program is excellent. I believe that we should have more programs that bridge the elementary school with post-secondary. It gives students a look into what they can do to give back and also gives them ideas around what they could study in the future” - Katherine Han, Gr. 7 teacher

By sending in primarily young, women volunteers the initiative challenged the stereotypic image many young people have about what type of people become scientists, and provided a role model demonstrating that they too can pursue a life in science. They showed students that science can happen in a lab, in a classroom, or in a rainforest, and that anyone can be a scientist – including the students themselves.

“The most enjoyable part for the students was making the ecosystems. They loved getting their hands on rocks to funnel them into the bottles and inserting the squishy plants. It was fun for them to transfer the delicate snails and shrimp from the bags to bottles and spoon in the mud. They were delighted to create these "mini worlds" with live creatures”.

Jacqueline Bruce, Grade 3 teacher
ORGANIZATIONAL SUMMARY:

Let’s Talk Science is an award-winning, national, charitable, science outreach organization. Let’s Talk Science creates and delivers hands-on, minds-on science and, unique to UVic, social science learning programs and services that turn children and youth on to science and social science, keep them engaged in learning and develop their potential to become 21st century citizens, innovators and stewards. Their focus is particularly geared towards STEM research in youth, and one of their goals is to increase the number of girls who pursue a career in these areas.

Let’s Talk Science operates out of 41 different universities and colleges across Canada, with outreach sites at Simon Fraser University, The University of British Columbia and the University of Victoria in the province of British Columbia.

Let’s Talk Science at the University of Victoria has been delivering free hands-on activities to youth in Victoria and throughout British Columbia since 1995. Let’s Talk Science Outreach at the University of Victoria has reached thousands of students in the past 19 years. In the 2013-14 year 4050 students were reached in the Greater Victoria area.

The University of Victoria has a special relationship with a private all-girls school, St. Margaret’s. Last year, as well as conducting classroom visits, visiting their summer camps and inviting the girls to attend various symposiums on campus, Let’s Talk Science also organized the first annual “Girls in Science Careers Day” for the Grade 10 and 11 students at the school.

For more information visit www.outreach.letstalkscience.ca/uvic
Let’s Talk Science University of Victoria hosted its annual ‘Girls in Science Career Day’ on April 23, 2015, attended by 80 young women in grades 10 and 11 from around Vancouver Island. Some students came from the Cowichan Valley, Chemainus, and Comox Valley. The aim of the career day was to expose upper level high school students to ideas for future careers and to some of the fields of science and social science that they may not be familiar with.

Women scientists and social scientists from the University of Victoria were invited to give 10-minute presentations on their career paths. Participants were then divided into groups for touring the campus, including the UVic telescope, the undergraduate biology laboratories, and a session with a panel of undergraduate and graduate students. Throughout the day the students met various female faculty members from different areas of science and social science including biology, neuroscience, engineering, computer science, chemistry, math, psychology and anthropology.

In addition to the ‘Girls in Science Career Day’, Let’s Talk Science provided further mentorship opportunities for young woman wanting advice regarding their choices at university and their future careers. By giving young women access to these opportunities, Let’s Talk Science has aimed to remove the stigma that surrounds women in science and ensure a safe and inviting environment for them as they transition between high school and academia.
MOSAIC is a multilingual, not-for-profit organization with more than 38 years of experience building the capacity of immigrants, refugees and newcomers to become fully participating members of Canadian Society.

MOSAIC provides a broad range of specialized services for newcomers and their families, spanning infancy to old age, from nine service Hubs across Metro Vancouver. On average, the organization serves 7,000 clients per month. Its contracts range in value from a few thousand dollars to the largest agreement, the Employment Program of BC, valued at $5.2M/year.

With more than 45 staff working in the Employment Programs Department and a $6M annual budget, MOSAIC is the largest immigrant serving organization providing employment services in British Columbia. MOSAIC is also a leader in the province in the development of online learning for immigrants studying English.

For more information visit www.mosaicbc.com
PROJECT SUMMARY:

ONLINE PRE-ARRIVAL SERVICES FOR WOMEN IN ENGINEERING

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $5,000

In 2015, MOSIAC BC piloted a series of facilitated online workshops for women engineers who have been approved to immigrate to Canada and plan on settling in British Columbia. This project designed several online learning modules to prepare women to qualify and work as engineers in Canada.

The modules were applied through facilitated workshops over a two week period in early March 2015. Eleven internationally-trained Women in Engineering who were approved to immigrate to Canada enrolled in the Pilot. They were from Iran, Turkey, and Egypt and were educated in computer, civil, electrical, hydro-electrical, environmental, and chemical engineering.

The learning objectives of the program included:

- Learners will identify steps necessary to apply for licensure in Canada, including necessary documentation
- Learners will identify the challenges they will face in Canada
- Learners will access key organizations that are relevant to licensure and working as engineers in Canada
- Learners will access key organizations that are relevant to licensure and working as engineers in Canada
- Learners will articulate the difference in professional requirements between BC and their home country
- Learners will be able to describe the difference between the status of women in engineering in their home country and in Canada
- Learners will describe realistic expectations of what they will experience in Canada

Participants were very positive about the outcomes of the session, suggesting they were now competent in understanding the challenges they will face in Canada, the variance in professional requirements between their home counties and Canada, licensure differences as well as the status of women in engineering.

In the post pilot survey, 100% of respondents indicated that they know how the Canadian engineering profession is regulated (vs. 50% pre pilot).

“I liked the workshop because I noticed that I’m not alone and my feeling is common with another women engineers” – course participant
CONFERENCE ON DIVERSITY IN ENGINEERING

ORGANIZATIONAL SUMMARY

(As organization presently exists):

Previously known as the National Conference on Women in Engineering (NCWIE), the Conference on Diversity in Engineering (CDE) aims to develop knowledge surrounding the variety of individuals, cultures and perspectives found within engineering communities.

Organized by the Canadian Federation of Engineering Students (CFES), CDE further aims to instill a notion of positivity and togetherness in creating spaces that value the differences between groups of engineering students and professionals. The purpose is for guests to not only leave with a solid understanding of the issues minorities encounter in the engineering profession, but also be equipped to appropriately address these issues to create a more inclusive and thriving community.

Students attending CDE will have the opportunity to meet and hear from successful, interesting, and talented speakers prepared to share their experience and knowledge on how to embrace diversity in order to better address the complex, interdisciplinary problems of society. The mission of the CDE is to support growth and communication, and to ensure moral, intellectual, cultural, academic, social, and economic well-being for its members.

CDE supports their mission by creating networking opportunities and providing a better understanding of the issues pertaining to diversity in engineering, all while inspiring leadership and active participation in all facets of engineering education.

For more information visit www.cfes.ca/events-and-services/cde
The National Conference on Women in engineering (NCWiE) is a Canada’s only student conference organized by students on diversity.

From November 22-24, 2013, delegates gathered in Vancouver, BC to continue the conversation on women in engineering. The theme for the event was, “Add Your Piece to the Puzzle”. The objectives of the conference were:

- Start a conversations: put diversity on the table in student government
- Increase awareness of the importance of diversity in engineering
- Encourage the retention of women in engineering

These were delivered through providing participant with tangible takeaways (templates and delegate packages), safe spaces for discussion, tools for difficult conversations, guided learning, presenting diversity from a holistic perspective – not just women, and sharing proven practices for women in engineering groups.

Delegates from over 30 universities were in attendance to discuss a broad range of topics on five streams: diversity, careers, outreach, conversation and inspiration. Workshops offered included:

- Anti-Discrimination Responses
- Building effective outreach programs
- Diversity in the workplace
- The value of diversity
- Active witnessing

The conference attendees were 87% women over the course of the 3 days and came from all across Canada. The conference was evaluated using instruments on self-efficacy and the awareness of the benefits of gender diversity. In the short term, the conference resulted in a statistically significant increase in both measures, and in the long term resulted in a statistically significant increase in awareness of gender diversity.
The Pacific Institute for the Mathematical Sciences (PIMS) Young Researchers Conference in Mathematics and Statistics (YRC) is a PIMS-sponsored, graduate-student-organized conference providing young researchers in the 12 PIMS universities to network and exchange scientific research in a student conference setting. The conference typically attracts 100-140 participants, and focuses on technical skills development for academia.

PIMs was created in 1996, with a mandate to:

- Promote research in and applications of mathematical sciences;
- Encourage the training of highly qualified personnel (such as graduate students);
- Increase public awareness of, and education in, the mathematical sciences;
- Encourage collaborations and partnerships.

The goals of the YRC include:

- Provide a forum to present graduate student research;
- Provide opportunities for networking and collaboration;
- Development of communication skills;
- Provide experience in the environment of a scientific conference.

The responsibility of organizing the YRC is rotated between member universities:

- University of Alberta
- University of British Columbia
- University of Calgary
- University of Lethbridge
- University of Manitoba
- University of Regina
- University of Saskatchewan
- Simon Fraser University
- University of Victoria
- University of Washington

The 2014 YRC was hosted by UBC from June 2 – June 5. The organizers of the conference chose to add an additional goal – to address gender diversity and equity in the mathematical sciences.

For more information visit [www.pims.math.ca](http://www.pims.math.ca)
The 2014 PIMS YRC included, for the first time, gender equity programming in the conference. The primary objective of the program was to increase the awareness of gender equality in academia in young mathematicians in academia. Efforts were made to ensure that the activities were seamlessly integrated into the day, and were inclusive of both genders.

The intervention consisted of two different interventions:

- Breakfast-time information sessions
- Panel discussion

The breakfast-time information session sought to provide hard facts and figures on women’s career in academia, based on the findings in *The Gender Dimension*. Excerpts from *The Gender Dimension* were distributed to provide students a fact-based entry point to understanding gender issues in academia.

The panel discussion was designed to provide alternate, personal viewpoints on gender equality of three high-profile female mathematicians. In the panel discussion, students asked many excellent questions relating to their own experiences and the facts provided in the breakfast-time information session. This allowed students to further their understanding and personal stance of gender equity directly on a personal level.

The program took place in Vancouver, B.C., with 65 registered participants (~90% male, 10% female) from the following universities: SFU, UVic, UBC, Lethbridge, U of A, McGill, UCalgary, UBC Okanagan, URegina, Harvard, University of Sao Paolo, Concordia, and Waterloo.

Our activities had successfully increased the awareness of gender gaps in academia in our participants. 33/37 survey respondents indicated that they learned new facts from the excerpts of *The Gender Dimension* presented in the daily breakfast-time information sessions. 13/33 respondents indicated increased interest in the subject of gender equality, while 18/33 indicated no change in interest and 2/33 indicated decreased interest. The majority of respondents (25/37) also agreed that the facts shown indicate an issue that needs to be addressed.

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**68% of responding participants agreed that the facts on gender gaps in academia show indicates that there is an issue that needs to be addressed.**
ORGANIZATIONAL SUMMARY:

ANITA BORG INSTITUTE

GRACE HOPPER CELEBRATION OF WOMEN IN COMPUTING

Co-founded by Dr. Anita Borg and Dr. Telle Whitney in 1994 and inspired by the legacy of Admiral Grace Murray Hopper, Anita Borg Institute’s Grace Hopper Celebration (GHC) of Women In Computing Conference is designed to bring the research and career interests of women in computing to the forefront.

For 13 years, the conference has brought together the community of women technologists, the best minds in computing and increased visibility for the contributions of women to computing. The conference is co-presented by the Association of Computing Machinery (ACM).

The conference results in collaborative proposals, networking and mentoring for our attendees. Conference presenters are leaders in their respective fields, representing industry, academia and government. The conference also offers professional development through a variety of activities.

The conference runs several affiliated regional conferences across the world, including the Pacific Northwest region.

For more information visit www.gracehopper.org
PROJECT SUMMARY:

PACIFIC NORTHWEST CELEBRATION OF WOMEN IN COMPUTING CONFERENCE 2014

WWEST PARTNER FOR: 2014
GRANT VALUE: $3,000

On May 9 - 10, 2014, the Pacific Northwest Celebration of Women in Computing Conference brought together over 100 women in Computer Science from the Pacific Northwest region onto UBC’s Vancouver campus for two days of professional development, networking and inspirational activities. Students got a chance to hear from, interact with, and be mentored by industry professionals, researchers and faculty members.

The theme for the year was passion and purpose. Passion draws from within; rooted in our talents, interests and identities, while purpose connects us outwards, enabling us to support others, build community, and make a positive difference in our world. The conference brought together women leaders and future leaders in computing from the Pacific Northwest for inspiration, support and practical guidance in pursuing meaningful and satisfying careers.

The conference included social events including a Speed Mentoring Event, with 116 of the 130 delegates attending, an evening social activity for students, and a Dessert Party for mentors and invited guests. Keynote speakers included Maria Klawe (Harvey Mudd College), Brenda Bailey Greshkovitch (Silicon Sisters Interactive), and Nicki Dell (PhD Candidate, University of Washington).

“All the keynotes were fantastic, the panels were great (especially the first one), all the events were great. I guess what I liked most was being surrounded by and talking to inspiring women in comp sci. I left feeling extremely inspired and motivated to do great things in the field.”
ORGANIZATIONAL SUMMARY:

Science Adventures (SA), part of the Yukon Research Centre at Yukon College, engages students, teachers and the community in the exploration of science and technology. SA provides support and resources to teachers and coordinates hallmark events and activities, such as the Yukon/Stikine Regional Science Fair, the Annual Bridge Building Competition, Stay-A-Day at Yukon College and the All-Girls Science Club. Since 1992, SA has been providing support to teachers, volunteers and parents to promote the fun of science and technology to students. These outreach services include access to science speakers, learning resources, community connections, special events, and field trips. SA receives funding from Yukon Department of Education, NSERC PromoScience, Yukon Research Centre and Actua.

SA has operated five successful All-Girls Science Club seasons and is committed to establishing a permanent program to which girls can look forward each year. SA has the capacity to hold program records, evaluation results, lessons learned and ideas for future years. As well, ongoing staffing will be provided through the SA Assistant, with support from the SA Coordinator, both secure positions.

Being housed at (but not funded by) Yukon College provides ready access to well-equipped classrooms and laboratory facilities, library and professional resource people. SA maintains numerous classroom science kits and resource materials, plus an extensive list of science contacts, including school teachers and principals, government employees, research agencies, private businesses, professional organizations and individuals willing to support youth science education initiatives.

For more information visit http://yukoncollege.yk.ca/research/pages/science_adventures
PROJECT SUMMARY:

ALL GIRLS SCIENCE CLUB

WWEST PARTNER FOR: 2012-14
GRANT VALUE: $6,000

The All-Girls Science Club engaged girls in grade 5-7 to explore new concepts, conduct hands-on experiments, ask questions and express their ideas in a non-intimidating, girls-only environment.

The program is unique to the Yukon region and provides the opportunity to explore exciting concepts, conduct experiments, develop career ideas and ask questions in a non-intimidating, girls-only environment.

Twenty girls joined the 2013 Club that met on eight Saturdays from March to June. The theme was “Science of Earth and Space” and the activity topics included:

- Solar system
- Hydrology
- Geology
- Surveying technology
- Robotics
- Geocaching
- Careers in science

One program highlight was the Skype chat with Canadian Space Agency astronaut David Saint-Jacques.

In addition to this, the All-Girls Science Club did an outreach event Haines Junction, 150km away from Whitehorse, on May 9th, 2015 in conjunction with the local school, Yukon College campus and Champagne and Aishihik First Nations. The curriculum from the current All-Girls Science club was used. Parents were invited to attend the last 30 minutes of the event where they were given resources for encouraging their daughters’ interest in STEM.

Three science kits are being developed for teachers or mentors to continue the exploration of science with girls. One will be left at St. Elias Community School in Haines Junction, one will be a gift to Teslin Community School in Teslin (180km from Whitehorse), and the third will be available on loan to twelve other schools in outlying Yukon communities.
PROJECT SUMMARY:

ALL GIRLS SCIENCE CLUB STRATEGIC EXTENSION

WEST PARTNER FOR: 2014-15
GRANT VALUE: $1,000

Science Adventures has operated five successful All-Girls Science Club seasons in Whitehorse and is committed to establishing a permanent program to which inquisitive girls can look forward each year, both in Whitehorse and outlying communities.

In 2015 the All-Girls Science Club corporate sponsorship program launched. This program will inform potential donors about the importance of supporting Yukon girls to pursue STEM education and careers. Working closely with Yukon College’s new Advancement Office from November 2014 to March 2015, Science Adventures explored gifting options and created promotional material for potential sponsors. In preliminary discussions, the Advancement Office agreed to take on the All-Girls Science Club as one of its inaugural projects.

A presentation was also made to the Yukon College Board of Directors on June 5th, 2015 to highlight Science Adventures’ youth science outreach programs and initiate discussions about new projects that would further support the directions they see for the college.

Finally, Science Adventures created an internal youth focus group at Yukon College and chaired three meetings. Participants included staff from Science Adventures, Community Relations, Continuing Education, Enrolment Services, Social Justice and Trade. The group created an informal inventory of current and planned youth-centered activities. Terms of reference are being developed.
PROJECT SUMMARY:

GO SCI-TECH GIRL

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $5,000

On May 20th 2015, Science Adventures organized the first Sci-Tech Girl event at Yukon College in Whitehorse. The program is designed for grade 10-12 and first-year post-secondary women students to meet science role models in a professional and social environment. The inaugural event attracted 10 participants, and created a small group environment where they connected with role models in STEM sectors in the Yukon. As one participant put it, “I got to listen to women talk passionately about their jobs in science.” It was featured on CBC Radio prior to the event.

The event began with a keynote address delivered by Jodi Gustafson, an Environmental Consultant, entitled “A Woman’s Place is in Science.” This was followed by a series of workshops, hosted by the mentors, and was a chance for the students to ask questions about their career paths. These sessions lasted approximately 2 hours.

Mentors and topics included:

- Dr. Katherine Stewart (Researcher, Yukon Research Centre) - “Taking a lichen to science”
- Karolina Machalek (Epidemiologist, Community Health Programs, YG Health & Social Services) - “Epidemiology: An interesting and rewarding career choice”
- Meghan Larivee (Animal Healthy Laboratory Coordinator, Fish & Wildlife Branch, YG Environment) - “Healthy environment, healthy wildlife: Monitoring health in Yukon wildlife”
- Sandy Birrell (Engineer, Stantec Consulting Ltd) - “A building’s body”

The event was very well received by all involved.

“I believe the presenters set positive examples of the various routes one can take to get into science and technology and successfully demonstrated how fulfilling a career in science or tech can be. There is no doubt in my mind that the girls left feeling somewhat empowered.”

- Sci-Tech Girl Mentor
Science AL!VE is a student-run not-for-profit organization based at Simon Fraser University in Burnaby, BC. Since 1994 they have provided opportunities for young people to explore science beyond the textbook through hands-on, interactive discovery, stimulating their interest and fostering their curiosity and confidence. Through various programs, their purpose is to make science accessible to all children, regardless of gender, culture, or affluence.

The organization targets under-represented groups in science and makes programs available to all those interested. Reaching over 8,000 students across Metro Vancouver and North British Columbia each year, the program strongly believes in maintaining the quality and depth of impact of their summer camps and year-round weekend workshops, girls programming and other initiatives.

For more information visit www.sciencealive.ca
For the past two years, Science AL!VE has partnered with Girls in Action, providing workshops to the city of Surrey. This year the program was expanded to provide a total of 22 workshops at four different locations in the city. Curriculum included computer science, hands-on technology use, scratch programming and circuit activities using the littleBits programming kit. Every workshop was taught by an undergraduate woman SFU student.

The littleBits kits are a system of electronic modules that snap together with magnets to create larger circuits. This kit is interactive and fun, providing the girls with an activity that really stimulates an interest in circuits, programming and computer science. The kits are lightweight and easily transportable, and were useful for other Science AL!VE programming.

Over the next few months the littleBits kits will be used in programming in five different communities in Northern BC, including Aboriginal outreach in Haida Gwaii. They will also be used in classroom workshops, community events, and outreach trips, reaching over 700 students during Science AL!VE’s yearly BC science workshop tour. It will also be used in our AL!VE girls summer program and our girls only summer camps at SFU Burnaby.
ORGANIZATIONAL SUMMARY:

Since 1991, Science Venture has been delivering hands-on, minds-on STEM learning opportunities for youth across Vancouver Island. Based at the University of Victoria (UVic), last year the team of 26 undergraduate instructors reached over 12,000 youth through in-school workshops, camps, clubs, and events. Central to the program is the undergraduate staff who bring the programs to life with their unwavering energy, passion, and drive. Not only do staff impact the lives of program participants, but they play an integral role in mentoring the high school volunteers. During the summer of 2014, 61 volunteers were trained and dedicated a minimum of two weeks as Junior Counsellors at camp. The volunteers learn from the instructors about the UVic student experience, they meet professors, and get behind the scenes access to University labs and research facilities.

Science Venture’s mandate is to stimulate an awareness of and enthusiasm for science, engineering and technology among youth, particularly those from under-represented groups, such as female and Aboriginal learners. Science Venture strives to foster supportive and creative environments that nurture the self-esteem of participants and enable them to develop skills and attitudes to succeed in the future.

Their vision is to inspire all Vancouver Island youth to explore their potential and discover their vital role in the world through life changing science, engineering, and technology experiences.

For more information visit www.scienceventure.ca
PROJECT SUMMARY:
HOOKED ON STEM

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $500

On March 28, 2015 53 girls in grade 3-6 attend the first “Hooked on STEM” event at the University of Victoria (UVic). Participants were welcomed by SV Director, Melisa Yestrau, and then watched a chemistry show. Six female undergraduate Science Venture instructors acted as group leaders for the day. A career photo booth was set up that allowed the girls to “try on” STEM careers.

The girls were provided with a scavenger hunt passport where they sought answers from our ten women mentors and famous women in STEM posters. Mentor scavenger hunt representatives included: Ladies Learning Code, Victoria Chapter; BC Women In Technology & Science; UVic Leadership Through Diversity; and UVic Women In Engineering and Computer Science.

Workshops during the event included one on science & tech communication in the media with CTV Vancouver Island host Coralie McLean, where they filmed their very own news segments, and a computer science workshop which focused on Scratch programming, blogging, and building circuits using littleBits kits. The day ended with prize draws and treats!

The high-impact event managed to engage a larger number of girls in the Southern Vancouver Island region and complement Science Venture’s well established year-round all-girls program. Forty-nine percent of participants responded that they were more likely to take science courses in high school after the event.

“How would you describe the day in one word?”

Amazing ● Good ● Supercalifragilisticexpialidocious
Awesome ● Great ● Unbelievable
Cool ● Interesting ● Unexpected
Fun ● Sciency ● Wonderful
ORGANIZATIONAL SUMMARY:

The Society for Canadian Women in Science in Technology (SCWIST) is a non-profit society operated by a volunteer board and three part-time staff. Established in 1981, SCWIST celebrates 30+ years of promoting, encouraging and empowering women and girls in science, engineering and technology.

The SCWIST Resource Centre supports the mission to promote, encourage and empower women and girls in science, engineering and technology. SCWIST also has two signature programs: ms infinity – a mentorship program for young girls – and Immigrating Women in Science and Technology (IWIS) – a program supporting immigrating professional women in science and technology. SCWIST is a member-based and volunteer-supported organization, with 177 active student and professional members, and 100+ volunteers. The Resource Centre is funded by the BC Government, including a part-time staff member who coordinates the Resource Centre. The coordinator ensures continuity and sustainability of programming offered by SCWIST, with support and guidance from the volunteer board.

The volunteer board is supported by several committees that contribute to the diverse areas of SCWIST. The current committees include: Events, Volunteers, Communications, Grants, Fundraising, and Programs. Each committee is comprised of talented women from diverse backgrounds both in science, engineering and technology, as well as external fields including business, marketing, and finance.

For more information visit www.scwist.ca
Through WWEST funding, SCWIST provided annual workshop series between 2012 and 2014. Seven workshops were offered on the themes of personal branding, tools for transition, and marketing skills in a new country. All workshops were delivered by industry experts. These events were targeted towards students, recent graduates and professional women in science, engineering and technology.

The 2012 workshop series focused on personal branding. Topics included:

- Dress for Success
- How to Successfully Market Yourself Online
- The Whole Package: How to Present Yourself Well and Leave a Good Impression
- The Art of Negotiation

Participants were surveyed after the event and a typical result was that 88% had gained new knowledge/skills that would help them advance in their work or studies, and that 69% had expanded their professional or personal network.

The 2013 workshop “How to market you skills to a job in a new field in a new country” was targeted to immigrant professional women. The participants learned about Canadian success stories and how to market transferable skills. There was also the opportunity to network with the attendees, SCWIST members and the speaker.

The post-event survey revealed that 77% of participants were more familiar with showcasing their skills, 62% were more confident in applying for a job outside their area of expertise, and 100% were more comfortable with networking in a professional setting.

“This workshop felt like it was personal. It encouraged us to dig deep and discuss honestly with others”
– 2014 Participant

The 2014 theme was “Tools for Transition and making life shaping decisions during times of change” and workshops were facilitated by Sally Halliday and staff from UBC Continuing Studies. Participants were exposed to practical models of change, as well as exercises to clarify participant values and identify transferrable skills.
**Organizational Summary:**

SWEEET is a symposium intended to address issues that influence the advancement of women from postgraduate degrees into academic, government, NGO and industry positions from backgrounds in ecology and evolution.

The transition into a permanent job is a critical step that involves many challenges; many of these are particularly relevant to women who tend to be underrepresented in scientific careers. Although a forum exists in the US to discuss these issues (WEBS, funded by the US National Science Foundation), prior to SWEEET, no such forum existed in Canada. In partnership with the Canadian Society for Ecology and Evolution (CSEE), SWEEET has offered the symposium since 2008.

The goals of SWEEET are to:

- Increase awareness of, and engage in a broad dialogue about, the challenges women face in the modern scientific workforce
- Facilitate networking for student/early-career scientists with established scientists from universities, government, and industry
- Share individual and institutional strategies to increase the representation, retention, and career success of women scientists

For more information visit [http://www.sweeetecoevo.weebly.com/](http://www.sweeetecoevo.weebly.com/)
The 2013 theme was “Shedding Light on Subtle Gender Biases in Science: Awareness, Challenges, and Solutions” inspired by a 2012 paper by Moss-Racusin et al. in the Proceedings of the National Academy of Sciences (PNAS). The 50 participants included tenured and non-tenured professors, post-doctoral researchers, graduate and undergraduate students, government scientists and university administrators. Organizers of the event represented institutions across the country, from the University of British Columbia’s Okanagan campus to University of Ottawa to McGill University.

Four panelists presented their perspectives on subtle gender biases in science, and offered practical advice and solutions on how to overcome this hidden obstacle in women’s career advancement. Speaker presentations were followed by lively discussions in both small and large groups. These discussions highlighted issues ranging from the challenges of shifting the culture of subtle gender biases in scientific departments, to tips on negotiating during the job interview process. A key outcome was the recognition of mentorship as a crucial component for young women at the early stages of their career, and during the transitions between graduate student, postdoc, and faculty member.

Responses to the question of whether SWEEET 2013 was useful to career development included: “Yes, it is encouraging to hear the experiences and tips from women in science today,” and “Absolutely, because I am now more aware of strategies to deal with gender biases.”
ORGANIZATIONAL SUMMARY:

UBC’s Advanced Molecular Biology Laboratory (AMBL) is a fully equipped research space dedicated to the development, delivery, and research of projects that provide experiences in the realms of science literacy, science communication, and science education.

In all, many of AMBL’s programs centre on a mandate to train scientists (university students, faculty, and industry professionals) and to inform the public at large on the societal, cultural, economic, political, and ethical nuances of the sciences. As well, AMBL has made a name for itself by often using creative and unconventional avenues of science communication and education, particularly where the intersection of science and other disciplines is explored.

AMBL hosts a diverse range of programs ranging from authentic research field trip programs, provision of publication outlets for creative science writing, as well as projects that engage in the interdisciplinary intersections between science and other disciplines.

For more information visit www.bioteach.ubc.ca
PROJECT SUMMARY:

WOMEN IN SCIENCE AND ENGINEERING TRADING CARD GAME:

A K-12 TEACHER RESOURCE THAT EXPLORES AND PROMOTES THE INTERSECTION OF STEM AND FEMINISM

WWEST PARTNER FOR: 2014-15
GRANT VALUE: $3,000

AMBL has been working on the development and production of a playable card game that is designed to embed a variety of important learning objectives about women in science and engineering.

The cards are designed to showcase a variety of scientists and engineers from different disciplines, different periods of history, as well as different ethnic backgrounds. Furthermore, the game highlights a range of societal challenges that relate to historical and contemporary gender issues. The goal is for students who want to pursue careers in STEM to be informed and inspired by these women and will follow their lead in being ground breakers in their own careers.

The ultimate goal is to produce a game that is both educational and fun to play. The WISE game project benefited from using pre-existing game mechanics that were previously developed and playtested in the Michael Smith Laboratories (see phylogame.org for more information). Modifications to this structure include:

- To learn about various women in science and engineering and gain an appreciation of them
- To learn about challenges that women in science face
- To create a resource that enables discussion and fosters the development of lesson plans that potentially work toward solutions for these challenges in the future.

AMBL are currently continuing to develop the game further and are working on expansion packs for the game. In April 2015, a beta version was tested with 75 high school students. Preliminary feedback included that the game was fun to play (scoring approximately 4 on a scale of 5), and the students were pleased with the overall content in terms of gender issue coverage, and most felt that the game had good potential value as a classroom teaching resource.

This project will continue past WWEST funding, with support from the Michael Smith Labs. AMBL is also committed to funding high quality art once the finalized deck is finished. A final starter deck is hoped to be made available in the first half of 2016.
ORGANIZATIONAL COLLABORATION SUMMARY:

See page 68 for AMBL organizational summary.

See page 28 for Geering Up organizational summary.
PROJECT SUMMARY:

GIRLS ONLY MAKER CAMP

WEST PARTNER FOR: 2014-15
GRANT VALUE: $2,500

The Girls-Only Maker Camp – held between August 10 and 14th, 2015 - gave 23 girls the opportunity to explore a Do-It-Yourself (DIY) style of STEM. The project was a collaboration between Geering Up and AMBL, which took advantage of resources and enthusiasm that MAKER MEDIA provides during its annual Maker Camps.

The camp supported girls between the ages of 10-14 by boosting their confidence in a safe, secure and supportive space. Activities in the 2015 Maker Camp included electronics, robotics, programming, mechanical/civil engineering, as well as more craft oriented exercises. To view the syllabus and record of each day please visit http://makercamp2015.blogspot.ca/

Five 13-14 year old girls who attended AMBL’s Maker Camp last year acted as volunteers throughout the program. There were two main instructors for the camp from Geering Up, and several guest speakers were invited throughout the week. AMBL is committed to continuing the Girls Only Maker Camp annually.
Faculty members in the UBC Department of Physics & Astronomy have organized outreach activities for several decades. In 1995, the Outreach Program was organized as a separate entity within the Department, with a purpose to communicate to the community at large the excitement and wonder of physics and astronomy.

Today, the Outreach Program runs many events throughout the year including national science competitions, summer camps, public science shows, teacher’s professional development workshops, public lectures, and develops online resources for teachers. It also publishes the outreach program newsletter, currently with more than 300 subscribers.

Their goal is to communicate the excitement and wonder of physics and astronomy, and its relevance to global issues and our everyday lives.

For more information visit [http://outreach.phas.ubc.ca/](http://outreach.phas.ubc.ca/)
PROJECT SUMMARY:
FASTER, HIGHER, SMARTER! WORKSHOPS

WWEST PARTNER FOR: 2011-14
GRANT VALUE: $5,975

UBC currently has an enrollment of 15-22% women in Engineering Physics and Physics and Astronomy programs. The original intention of this project was to focus on girls in Grades 6-8. After the first year of workshops in 2012, the activities were redeveloped for a younger audience as they found there was a strong demand for physics and engineering-related activities for audiences like Girl Guide Brownie groups. All workshops were run by UBC undergraduate students, staff and faculty.

The initial workshop – Faster, Higher, Stronger! – was a free one-day event focused on understanding how people move can improve sports performance. Eighteen Grade 6-8 girls were engaged in real world scenarios (sports) without emphasizing that the workshop was about physics. This was successfully achieved for most students. Activities focused on principles behind running and swimming, making timing gates, and taking photos of batting and swinging to improve performance. A pre/post survey demonstrated that the workshop had a positive impact on students that participants, and most students showed an improved attitude and understanding of STEM fields.

Following a year of workshop redesigns, a second wave of programming was offered in 2014. The Girl Guides Brownie workshops included a wind turbine activity which lasted 3 hours. This was completed over two sessions, one week apart. The four Brownie Group visits were evaluated with a pre/post survey with questions on the participants’ interest in science and perception of gender differences in STEM fields. Overall 60 pre-surveys and 56 post surveys were completed, with the percentage of children responding Yes is shown in blue on the graph below, maybe/sometimes shown in orange, and no in gray.

Children were also asked what they thought a physicist does. “I don’t know” responses are demonstrated in gray, while other responses are shown in orange.
Since its creation in 2004, GIRLsmarts has been volunteer run. UBC Computer Science students work one-on-one with grade school girls to explore a variety of aspects of technology, from programming to user interfaces. Three student coordinators oversee the logistics of the workshops. Volunteers organize two Grade 6 workshops throughout the year, with an additional Grade 7 workshop premiering in 2013. Registration for students in underprivileged regions in Vancouver opens two weeks before it opens to the rest of Metro Vancouver to increase the program’s accessibility.

“Given the fantastic opportunities in computing, as well as the impact that computer technologies have in our world, it’s important that girls as well as boys explore and pursue their interests in the field,” says Anne Condon, head of UBC’s department of Computer Science. “GIRLsmarts volunteers are great role models who help dispel negative myths about computing that might deter girls, and provide a great hands-on experience for participants.”

Recently GIRLsmarts has rebranded to GIRLsmarts4tech.

For more information visit http://www.cs.ubc.ca/girlsmarts4tech/
PROJECT SUMMARY:

GIRLSMARTS COMPUTER SCIENCE WORKSHOPS

WEST PARTNER FOR: 2011-13
GRANT VALUE: $4,500

The GIRLsmarts program was designed to foster a curiosity and interest in Computer Science for girls in Grades 6 and 7. The goal of the program is to create a positive experience related to Computer Science and technology for participants by engaging them in fun and educational activities. Workshop activities included creating a website using HTML, designing an iPad application, programming LEGO Mindstorms robots, and programming a game using Microsoft Kodu.

Before 2012 the workshops were held on campus and most participants attended from the local area. In 2012 the first off-campus half-day workshop was held for students from East-side Vancouver schools. Working with the UBC Learning Exchange, Surrey School District, and the Aboriginal Child and Family Support Service with Vancouver Native Health, there were two half-day off-campus workshops in 2013, with a total of 34 participants.

At the end of each workshop, participants were asked to fill in a feedback form about how much fun they had, and how much they learned - ranking each activity on a scale of 1 to 5 (with 5 being the best). In 2013, the average score for each activity was 4 or higher. The feedback from parents was also very positive, with many asking if similar workshops or summer camps would be offered by UBC in the future, if workshops could be held for longer periods of time at schools, and if there are similar workshops for boys.

GIRLsmarts 2013 had over 150 participants and was run with the generous help of 46 student volunteers. Recommendations based on the new Eastside Vancouver workshops were compiled for future years.

"I liked how much new and cool stuff I learned and all the new things we got to try, I want to download the programs at home!"
- GIRLsmarts Participant
The mission of the Women in Science and Engineering (WISE) Mentoring Program is to support the success of young women transitioning from their undergraduate education to a career in science or engineering, and to prepare and mentor them to remain in scientific careers.

Originally started as a workshop series in 2006, the Mentoring Program began in spring of 2011 at the University of British Columbia’s Okanagan Campus. The formal program launched in September 2011, and has continued each academic year since.

The WISE program continues to be scientifically evaluated in terms of its usefulness through a longitudinal study that examines how the formal mentoring program contributes to young women’s academic success and their transition into professional careers or graduate studies.

For more information visit www.wise.ok.ubc.ca
PROJECT SUMMARY:

WOMEN IN SCIENCE & ENGINEERING WORKSHOPS

WWEST PARTNER FOR: 2011-13
GRANT VALUE: $3,500

The women in science and engineering workshops are open to all women students in Science and Engineering at the University of British Columbia’s Okanagan campus. It is not a requirement for participants to be a part of the mentoring program to attend.

At the workshops, women from a variety of science and engineering professions address career topics, share their career paths, and answer questions from the undergraduate and graduate student audience. The workshops included dinner, a panel discussion, as well as time for informal networking for all the participants.

Feedback from students showed that many of them were unaware of issues such as salary differential, the need for negotiation, workplace demands unique to women, and the likelihood of career path changes.
PROJECT SUMMARY:

WOMEN IN SCIENCE & ENGINEERING (WISE) MENTORING PROGRAM

WWEST PARTNER FOR: 2011-13
GRANT VALUE: $4,500

The UBCO WiSE Mentoring Program was launched in September 2011. This program provides longer-term connections between students and professional women, with approximately six events from September to April each academic year. The events typically include information sessions, orientations, a mentor-mentee introduction session, a professional development event and an end-of-year celebration.

Over the three years of WWEST funding, the program served 86 science student mentees, 35 science mentors, 26 engineering mentees, and 18 engineer mentors. Overall the Mentoring Program made a positive impression on both mentors and mentees, with both groups happy with their mentorship pairings.

Overall, the WiSE Mentoring Program made a positive impression on both mentors and mentees. Most students said that they did not have to overcome any challenges during the WiSE program.

Mentors and mentees were happy with their match-ups, which contributed to their overall positive experience. All student mentees said the WiSE Mentoring program was a rewarding experience to them academically and personally. There were three areas that mentees would like to see improved in the future: more communication with their mentors; an additional social event to engage with other mentees and mentors in November (more face to face interaction); and more flexible meeting times for workshops and events throughout the year.

The most common accomplishments indicated by mentees included:

- Gaining information about their profession through engaging in general discussions with their mentor and by meeting with their mentor at her workplace
- Receiving advice in career planning by receiving helpful interview tips from their mentor
- Engaging in informational interviews, and receiving constructive feedback of their resume/cover letter from their mentor
- Learning about issues faced specifically by women in their professions
The Women in Science and Engineering Mentoring Program at UBC’s Okanagan Campus is currently being evaluated through a longitudinal research study. Unique to this mentoring program is the perspective longitudinal study that explicitly examines how a formal mentoring program contributes to young women’s academic success and their transition into professional careers or graduate study. The objectives of this study are:

- To gain insight into the mentoring program by identifying the activities and outcomes of the program
- To assess the impacts of the program by identifying the successes and areas for growth
- To understand how the program affects participants in terms of their immediate and long-term academic and career goals

These objectives are assessed through pre/post program questionnaires administered to mentees and mentors, analysing feedback from mid-program focus groups for mentees and mid-program interviews with mentors, and examining the post-event reflection exercises completed by mentees. This research is approved by UBC’s Research Ethics Committee annually.

The funds from the WWEST Impact Measurement grant were used to hire two students to adapt two of the Valid Assessment of Learning in Undergraduate Education (VALUE) rubrics (Integrative Learning, and Civic Engagement), developed by the Association of American Colleges and Universities.

Data analysis is currently underway, and preliminary findings have demonstrated the benefits of using VALUE rubrics and modified focus group design. Early results indicate that the WISE Program is meeting its intended objectives. Students who participated in the WISE program for more than one year are demonstrating higher levels of integrative learning and civic engagement, as measured by the VALUE rubrics.

These results have been disseminated through several conference presentations, including the International Conference of STEM in Education, Annual Meeting of the Pacific Northwest Association for Institutional Research and Planning, and the International Conference on Health Promoting Universities and Colleges. A paper of the results is currently in preparation for the Canadian Journal of Program Evaluation.
UBC WOMEN IN ENGINEERING (WIE)

ORGANIZATIONAL SUMMARY:

Established in 2005, the vision of UBC WIE is to create a safe and inclusive environment that allows women students to participate fully and equitably while they are in enrolled in Engineering at UBC.

The program creates opportunities for students to engage in dialogue, network with peers and industry professionals, and enhance their academic, leadership, professional, and personal competencies via a myriad of workshops and events to best prepare them for the engineering workplace. Spearheaded by a Student Council, WIE programs serve all women students at UBC.

With a committee of graduate and undergraduate students, as well as support from faculty and industry partners, WiE strives to:

- provide professional development opportunities for all engineering students
- create an inclusive environment for all students
- eliminate systemic barriers to female engineering students’ participation
- create a support for women currently in the field

Several WiE events such as the APEGBC Salary Seminar and December 6th Memorial and the Women in Science and Engineering networking event have become stronghold events that have contributed to creating a supportive and safe campus community for all engineering students.

For more information visit [www.wie.engineering.ubc.ca](http://www.wie.engineering.ubc.ca)
Anually WiE partners with the UBC Faculty of Science to host the Women in Science and Engineering (WISE) networking event. Attended by students and industry professionals, WISE offers students the opportunity to receive career advice from professional women in the industry, connects students to potential mentors, and supports women students in science and engineering.

The purpose of the event is to allow students to discover the potential behind their degrees and introduce them to women who have taken traditional and non-traditional paths that have led to exciting careers. Students read about and select mentors they would like to meet prior to the event. Over the evening, students rotate between pre-matched mentors for table discussions in small groups with other students. The night also features a keynote speech by a prominent women in STEM.

WISE provided a professional development opportunity for students and organizers by focusing on networking, public speaking, event planning and event marketing and promotion. Student organizers were able to create strong networks with UBC staff and faculty, UBC organizations and industry representatives. The direct benefits to student attendees included immediate networking with mentors in very specific fields, exposure to the various career paths that engineering and science degrees can bring, and an introduction to the various mentorship resources available through UBC Alumni, Tri-Mentoring and UBC WiE.

Between 2011 and 2014 over 250 students and 100 mentors attended the annual WiSE event. Of the 70 students who attended in 2014, the majority said they had an increased confidence in their degree choice, an increase in energy for discovering the potential behind their degree, an increased value towards mentor relationships, and gaining a new perspective on their career and personal paths.
ORGANIZATIONAL SUMMARY:

Inspired by the Building Communities Symposium first run in September 2007, Women in Engineering (Vancouver Region) is a group of engineering women continuing the efforts to create a network of women engineers in the Vancouver region.

The organization aims to promote skill enhancement workshops and strong connections to a diverse group of women in engineering across workplaces, engineering fields, and universities, in the Vancouver Region.

Its mission is to provide a diverse group of women in engineering with networking events and skills enhancement workshops in a welcoming environment and to continuously build and maintain a network of strong relationships among women in engineering in the Vancouver Region.

For more information visit www.wievrcanada.ca
The Vancouver regional group of Women in Engineering aims to promote and enhance women in the industry by organising regular workshops and conferences. WWEST Partners funding has helped to support three workshops annually for 2011-2013. Overall these workshops reached over 150 women.

The November 2011 workshop was “The 3 massive mistakes even smart business professionals make that keep them overstressed, unhappy and unhealthy”. A woman business professional’s life can be extremely stressful as, in addition to doing a job, there are many other demands on time, energy and resources. The presenter provided strategies for when you feel pulled in multiple directions trying to meet all the demands. Participants were asked what they particularly enjoyed and the feedback included “Very informal event but at the same time very professional”, and “The candidness of the speaker and willingness to share her personal experience.”

Judi Hess led the November 2012 workshop “The Gender Gap in Engineering: How far have we come? Where do we go from here?” Judi showed that girls outperform boys in math and physics, but very few work in these fields. She talked about some of the underlying reasons for this attrition, as well as what can be done to improve this situation. Throughout the presentation, Judi also told stories of her personal struggles and the road blocks she overcame to get to where she is now, the CEO of Copperleaf Technologies.

In January 2013 the interactive workshop was entitled “Entrepreneurship and starting your own consulting business”. Donna Denny presented her journey to business ownership and gave practical tips on how to start a consulting business, and how to tackle the internal demons. Participant feedback included: “The presenter was very interesting, a great role model”, and “Good job! Please keep it up!”
WIPC is a national conference aimed primarily at (but not restricted to) graduate students in physics, astrophysics, mathematical physics and related fields. In previous years, the conference was held at the University of Waterloo, University of Toronto and Simon Fraser University, as well as UBC.

WIPC is first and foremost a scientific conference, in which early career scientists have the opportunity to present their work and to hear plenary talks from leaders in the field. Its intent is also to provide support to early career women, encouraging them to continue in a career in science. The conference provides participants with the opportunity to network with women in physics from across Canada, to facilitate the sharing of experiences, ideas and advice. WIPC aims to foster a sense of community and belonging among participants.

The conference consists of a combination of:

- Plenary science talks by leading women in physics in Canada
- Expert panels focused on topics of interest to Canadian female graduate students and postdocs in physics
- Oral and poster sessions for scientific presentations by attendees
- Social events to facilitate networking and mentorship of participants.

For more information visit www.womeninphysicscanada.ca
The second Women in Physics Canada conference ran from August 1st – 4th August 2012 at the University of British Columbia. The event began with a BBQ reception and was attended by 110 participants from 34 universities across Canada and the U.S, comprising a variety of young women in all areas of physics (including Engineering Physics & Astronomy) primarily undergraduate and graduate students, as well as early career physicists and postdocs.

During the three days, conference participants attended 6 invited plenary talks, a poster session featuring over 30 contributions, 3 panel discussions, and 6 sessions of contributed talks by conference participants (a total of 42 contributed talks were presented).

In addition, over $11,000 dollars of leveraged funding was received from various sources for the conference.

In a post-conference survey, over 80% of respondents indicated that the conference was useful towards advancing their careers in physics.

“It was very cool to learn about careers in industry, as this information is not easy to come by in academia. Also, to hear about a variety of career paths from diverse women was extremely interesting and helpful.”

- Participant
The third annual Women in Physics Canada conference ran from July 25 - 27, 2013 at Simon Fraser University’s Burnaby campus. There were 63 participants, including undergraduate and graduate students, postdocs, physics teachers and faculty from across Canada and the USA, 12 panelists and seven invited speakers:

- Corina Andreoiu, Barbara Frisken and Karen Kavanagh (SFU)
- Sabine Stanley (University of Toronto)
- Sylvia Wessel (Ballard Power Systems)
- Shohini Ghose (Wilfrid Laurier University)
- Paula Heron (University of Washington)

Aimed at young women in all areas of physics, the conference addressed the underrepresentation of women in the field of physics by giving participants an opportunity to present their research as contributed talks and poster presentations. There were also opportunities to network during the many coffee breaks, the poster session BBQ, and the banquet dinner. Three panel discussions on Alternate Academic Careers, Career and Family Issues, and How to Get a Job in Industry provided the participants with valuable information.

The evaluation survey showed that 73% of the respondents agreed with the statement “This conference made me feel more satisfied with my career choice”, and the same percentage also agreed that the conference provided them with some coping strategies to succeed in their careers.

WWEST Partners funding went towards the $100 travel grants for BC residents from outside the Lower Mainland. It was also used to subsidize the registrations of the 47 participants who reside in BC.
APPENDIX 13:

PRE-PRINT: IMPACT OF A WOMEN IN STEM CONFERENCE ON TWO INDICATORS OF CAREER PERSISTENCE: EVALUATION DESIGN AND RESULTS
Impact of a Women in STEM Conference on Two Indicators of Career Persistence: Evaluation Design and Results

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Introduction

Workshops and conferences are common venues for dissemination of information and are often cast as interventions aimed at a specific outcome for the target audience, e.g., gaining knowledge in a particular field, or developing a particular skill. While the outcomes of very focused training sessions can be tested using traditional means, the effectiveness of broader-topic, short-duration events (e.g., conferences for: women in science, technology, engineering and math (STEM), aboriginal educational leadership, men in nursing) to change outcomes for participants is not well documented. Without measurable proof of an intervention’s impact, it is difficult to create sponsor and participant buy-in for future activities. Measurement, therefore, is an important yet neglected component of these types of interventions.

In the past few decades, studies have presented the business case for gender diversity, citing benefits for organisations including better economic performance (Council of Canadian Academies, 2012; Catalyst, 2004, 2007, 2011; Adler, 1999, 2009; Orser, 2000), improved governance (Mateos de Cabo et al., 2012; Brown et al., 2002; Boulanta, 2013), increased innovation (Woolley and Malone, 2011; Torchia et al., 2011; Diaz-Garcia et al., 2013), and recruiting from a wider talent pool (Grovsvold, 2011). Many traditional workplaces currently emphasise linear career paths, a large amount of in-person time at the workplace, and long hours; characteristics that do not reflect the challenges of many highly qualified women, 60% of whom have non-linear careers (Hewlett, 2007). Engineering, specifically, has a highly competitive culture which can increase stress levels for women, (Dryburgh, 1999), dissuade employees from taking advantage of inclusive policies (Lee et al., 2010), and does not promote inclusivity for women in the industry (Cheryan, 2012; Diekman et al., 2010). Shifting traditional workplace

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climates towards inclusive practices is essential for retaining a diverse workforce, and an inclusive climate can reduce relationship and task conflict, and turnover in gender-diverse groups (Nishii, 2013). Given the need to replace a rapidly aging engineering workforce (Engineers Canada, 2015), gender equality in the workforce is worth pursuing.

The participation of women in Science, Technology, Engineering, and Mathematics (STEM) remains low despite achieving overall gender representation in the workforce. In Canada, women make up 47.4% of the total workforce in 2006, but only 21.9% of the paid workforce in science and engineering occupations (Statistics Canada, 2006). For engineering specifically, only 11.7% of Canadian Professional Engineers (P.Eng.) are women (Engineers Canada, 2014). Similar figures exist in the US; in 2010 women held 28% of science and engineering positions, and only 13% of engineering positions (National Science Foundation, 2013).

Research on the barriers to women’s participation in STEM is prolific, as summarised in reports initiated by national bodies, including *Why so few?* (AAUW, 2010) supported by the American National Science Foundation, and *The Gender Dimension* (Council of Canadian Academies, 2012) published in response to a request by the Canadian Minister of Industry. Both reports list perceived interest, workplace environment, implicit bias towards women and family responsibility as major barriers for women’s participation in STEM.

These investigative reports and other literature also provide suggested practices to increase the recruitment and retention rates of women in STEM. Some documented practices/interventions include mentorship (Rutz and Shafter, 2011), workshops (Lawrence and Mancuso, 2012; Rutz and Shafer, 2011; Weavers *et al.*, 2011), and leadership development programs. Other suggestions include workplace interventions such as adopting family friendly policies, changing workplace culture, and increasing the presence of women in higher positions (Servon and Visser, 2010).

Conferences on the topic of women in STEM are increasingly common, aimed at raising awareness of barriers to and best practices for supporting women’s involvement in STEM. This type of event has the potential to influence a large number of people. Examples of high profile conferences include: nationally, the Canadian Coalition for Women in Engineering, Science, Trades and Technology (CCWESTT) Conference, and the Gender and STEM Conference in the Netherlands, and internationally, the Gender Summit, and the Anita Borg Institute’s Grace Hopper Celebration. These conferences share similar mandates along three themes: (1) increase women’s involvement and persistence in STEM; (2) build support networks and mentorship; and (3) advertise career opportunities (VHTO, n.d.; Canadian Coalition of Women in Engineering, Science, Trades and Technology, 2014; Portia Ltd., 2013; Anita Borg Institute, n.d.). However, there is a lack of public reporting on conference evaluation, with the few available statistics focusing on participant satisfaction (Anita Borg Institute, n.d.) as a measure of success, rather than reflecting on the conference goals.

Program evaluation is considered by experts as crucial to program success and sustainability (Caffarella, 2002; George-Jackson and Rincon, 2012); it allows us to understand
and communicate the value of the intervention to the stakeholders, and the public. The lack of program evaluation in STEM conferences may be a reason why major reports such as *The Gender Dimension* have not mentioned conference activities as an important intervention in the multifaceted effort towards increasing women’s representation and persistence in STEM.

This paper investigates the value and impact of conferences on women’s representation and career persistence in STEM. The objective of this paper is twofold. First, we propose a framework of program and evaluation planning that allows us to understand the value of conferences to women’s representation and persistence. Our focus is on deciding *what* and *how* to evaluate at a conference. We develop our approach with the case study of the regional Creating Connections Conference 2013 (CC2013) held in Vancouver, BC.

The second objective of this paper is to demonstrate that conferences, generally of short duration, impact participants by inducing changes in the participants that are sustained in the short- and medium-term. This is highlighted through the results from CC2013, where we captured short-term changes with a post-event measurement immediately following the conference, and medium-term changes with a follow-up measurement at six months post-event. A statistical test of significance is used to conclude a non-zero change in participants on average.

We note that this paper marks the first attempt at not only explicitly linking the impact of conference events to women’s persistence in STEM, but also in the use of validated instruments at a Canadian conference for women in STEM. The subsequent sections account the interdependence between conference and evaluation design decisions; thus, this paper provides an exemplary demonstration of the importance of hand-in-hand program and evaluation planning (Caffarella, 2002).

**Methods**

**Selecting appropriate measures of success**

The importance of embedding program objectives in evaluation is seen in popular approaches to evaluation, including: the “Levels of Evaluation” approach (Kirkpatrick, 1998; Guskey, 2000), objective-based approach (Caffarella, 2002), and the “Accountability Planner” approach (Vella *et al.*, 1998). We adopt the objective-based approach in our design; in this approach, “the purpose, design, and criteria for the evaluation are all drawn from [the] objectives” (Caffarella, 2002, p. 249).

As previously mentioned, many conference organizers, including the authors, consider *increasing* the involvement and career persistence for women in STEM as an important goal for intervention activities. While women’s increased involvement and persistence in STEM can be measured through a longitudinal study of gender ratio and career attrition rates, it is unrealistic to expect to relate a single event to career outcomes. Rather we propose to measure proxy targets, namely attitudes or conditions that would be precursors to involvement and persistence for women in STEM. We reviewed psychology literature to find psychological constructs that can
reflect changes incited by interventions in a timely fashion. We later define the changes required of these target constructs as the program objectives.

The awareness of the benefits of gender diversity in the workplace (awareness-BGD) was identified as an appropriate construct for evaluation because it is related to an important barrier to women’s participation in STEM: devaluation in the work environment. In the Panel analysis for The Gender Dimension on a Survey of Canadian Research Chairs (Council of Canadian Academies, 2012), devaluation by colleagues and superiors was the most frequently cited barrier to women’s participation in STEM. Literature suggests that raising the consciousness (synonymous to awareness) of a problem behavior is the first step towards creating behavioral (Prochaska et al., 1992) and social (Kloos et al., 2011) change. Based on research by Smith and Petty (1996) on efficacy of messaging, we chose to target a positive message (the awareness of the value/benefit of gender diversity), rather than a negative message (the consequences of devaluation). We adopted the 18-item, validated awareness-BGD instrument developed by the Authors (Author citation, forthcoming) for measuring awareness-BGD at CC2013. The instrument was tested for construct validity through factor analysis and “known-group” approach, internal-consistency through the Crochbach’s alpha coefficient, test-retest reliability through a two week separation between tests, and sensitivity to change through a controlled experiment.

Career self-efficacy is the second construct we chose to target and measure in our conference. Self-efficacy is an important target of intervention because research shows that it is unequal amongst genders (Concannon and Barrow, 2012) and a recognized barrier (Orser et al., 2012) for women in STEM. Furthermore, it positively correlates with career persistence (Hackett and Betz, 1981; Ballout, 2009). We measured the change in self-efficacy to correlate the impact of our conference with change in career persistence. We adopted the six-item career self-efficacy instrument developed by Rigotti et al. (2008) for measuring career-self-efficacy at the conference.

Conference design

Creating Connections 2013 was a 300-person regional conference held in Vancouver, BC, Canada at the University of British Columbia. The conference was open to all, but focused on issues related to gender diversity in STEM. It was part of an established bi-annual conference series, namely, the Building Communities Symposium in 2007, and Creating Connections Conferences in 2009 and 2011. Based on the literature review above, conference organizers established two main objectives for the conference: (1) increasing participants’ awareness of the benefits of gender diversity in STEM, and (2) having a positive effect of career persistence for women participants.

The format of the intervention was a one-evening, one-day conference. This allowed the use of multiple learning formats and styles, ensuring that participants would stay engaged (Ravn, 2007; Louw and Zuber-Skerritt, 2011), could select sessions that best suited their learning preferences (Haley et al., 2009), and allowed for a larger number of participants than could be
accommodated at a workshop or seminar. Efforts were made to ensure barriers to participation were eliminated (childcare provisions, sponsorships for students, travel funding). The conference included a wide range of topics beyond gender diversity, addressed through a diversity paradigm, to attract a broader audience (Hoyt and White, 2011; Mair and Thompson, 2009; Briziarelli, 1996).

The conference structure included formal and informal learning, mentoring, and reflection. Formal learning took place through keynote lectures, workshops, and panel discussions. Informal learning included networking, world café discussions (loosely guided brainstorming), and idea exchanges (informal discussion circles). Providing both formal and informal learning opportunities allowed participants to both obtain and exchange knowledge.

Participants were guided through mentoring and reflection through purposeful framing of the event by the organizers in the program and in introductions to conference content (Ravn, 2007; Ravn and Elsborg, 2011), and Connect and Reconnect sessions - small groups that gathered at the beginning and end of the day. The reflections were designed to ensure participants could explicitly identify key experiences and knowledge. The questions for these sessions are listed in Table 1. Reflection is important to clarify an experience and link it to other domains.

Bandura (1977) specified four factors contributing to self-efficacy: (1) performance accomplishments, (2) modeling, (3) encouragement and support, and (4) reduced anxiety. Conference programming targeted two of these factors. Modeling was present in the panel discussions, keynote lectures, and some parallel sessions. Encouragement and support was provided through networking, Connect and Reconnect, and informal learning sessions.

Table 1. Questions for Reflection during the Creating Connections conference 2013

<table>
<thead>
<tr>
<th>Framing Messaging</th>
<th>We leave you with three goals to accomplish today:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Connect with three new people and learn their stories</td>
</tr>
<tr>
<td></td>
<td>2. Discuss the value gender diversity brings to our organization</td>
</tr>
<tr>
<td></td>
<td>3. Let yourself be inspired</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connect Group Questions</th>
<th>1. Icebreaker: Introduce yourself: who are you, how do you spend your time, and why do you relate to this interest group?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Why did you decide to come to Creating Connections? Name one thing that you want to take away from today’s event.</td>
</tr>
</tbody>
</table>
Reconnect Group Questions

1. What is the key thing that you are taking away from your experience today?
2. What one thing will you do or change as a result of your experience today?

Evaluation design

Survey format

All survey questionnaires used in this study contain four major components: study description and informed consent, self-generated identifier code (Yurek et al., 2008), self-efficacy survey items, followed by awareness-BGD survey items.

The self-efficacy survey items were taken from Rigotti et al. (2008), composed of six questions and were used without modification. The awareness-BGD survey items were taken from (Author citation, forthcoming), a total of eighteen questions, and were used without modification.

The post-event survey contained an extra page at the end, which solicited the participant’s consent to be contacted for the follow-up survey. Participants were asked to provide contact details if they consented to being contacted.

Evaluation logistics

Conference evaluation was administered at three points: immediately pre-conference (pre), immediately post-conference (post), and at six months after the conference (follow-up). The pre-conference evaluation consisted of paper-based surveys. At the time of registration before the plenary event, participants were given the pre-conference survey and asked to fill it out. Participants were also approached by staff to encourage participation of the survey. Responses to pre-conference surveys were accepted from the time registration opened until the end of the first plenary event. When respondents exited the lecture hall they were asked to return the completed pre-conference survey, or were reminded to do so in the next five minutes. In total there was roughly 1.5 hours for participants to complete and submit their pre-conference survey.

The post-conference evaluation also consisted of paper-based surveys. Surveying began prior to the final plenary session. Participants were given the post-conference survey before they entered the lecture hall for the closing plenary. Survey responses were collected after the plenary talk, when participants exited the hall. Participants were also reminded during the plenary talk to fill out and return the survey when exiting the hall had they not done so. The survey officially closed after all participants left the event venue.
The follow-up event was administered via an online survey system, six months after the event. All respondents who consented to be contacted were emailed the survey link, and were given two weeks to complete the follow-up survey.

**Data Matching**

Prior to performing statistical analysis, we matched surveys based on anonymized participant-generated identifiers on every returned survey using Levenshtein distance – a probability based matching scheme recommended in Schnell et al. (2010). We use the R package “RecordLinkage” to perform matching by Levenshtein distance. The author of this package recommended using the Levenshtein similarity function (Borg, 2013) which produced a value between 0 and 1 as an indication of degree of similarity. As an example of the matching process, we compared a self-generated code from the post-event surveys against all self-generated identifiers from the pre-event surveys using the Levenshtein similarity function; the pre-event identifier that had the highest similarity value was taken as the match. To avoid false matches, we required a minimum similarity of 0.6 before a match was declared. The minimum similarity requirement was strict enough that a manual inspection of declared matches showed no sign of false matches.

**Hypothesis testing**

We tested a total of four hypotheses, that, on average, attendees of CC2013 had (1) a short-term improvement in self-efficacy, (2) a short-term improvement in awareness-BGD, (3) a medium-term improvement in self-efficacy, and, (4) a medium-term improvement in awareness-BGD. To show short-term change we studied paired responses from the pre- and the post-surveys. To show medium-term change we studied the pre- and follow-up surveys. The self-efficacy and awareness-BGD components were examined separately, each on the basis of *a total score* of survey items (Boone and Boone, 2012).

To test for a change, we used a two-sided, paired-t-test. The t-test allowed us to conclude if on average, a person’s score at a later time differed from a person’s score at an earlier time. We used a finite population correction (FPC) corrected t-test whenever we matched a large proportion of the total number of participants, to account for the representativeness of the result captured, similar to Curtis and Keeves (2000).

We set our overall significance level to 5%. This corresponded to a chance of 1/20 of erroneously concluding statistical significance. Since we identified four primary effects of interest (short-term self-efficacy, medium-term self-efficacy, short-term awareness, medium-term awareness), we required the p-value for each test to be less than 0.0125 for statistical significance, according to the Bonferroni correction as advocated by Bland and Altman (1995).

**Results**

A total of 316 people registered for the Creating Connections Conference 2013. However, the actual participation at the conference was projected to be between 200-250 people. The demographics of registered participants can be found in Table 2.
### Table 2. Participant Demographics at CC2013

<table>
<thead>
<tr>
<th>by Sector</th>
<th>n</th>
<th>% total (exclude n/a)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>124</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>106</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>31</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>13</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>5%</td>
<td>1 not-for-profit, 1 consulting, 1 media, 1 commerce, 1 family services, 1 political science, 2 psychology, 7 presenters</td>
</tr>
<tr>
<td>n/a</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>316</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>by Role</th>
<th>n</th>
<th>% total (exclude n/a)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Student</td>
<td>66</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Undergraduate students</td>
<td>52</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Junior industry and Academe</td>
<td>46</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Senior Industry and Academe</td>
<td>38</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Industry (unknown level)</td>
<td>14</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Junior Management</td>
<td>14</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Currently seeking Employment</td>
<td>13</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Executive</td>
<td>12</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Senior Management</td>
<td>10</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Teacher/Counsellor/Advisor</td>
<td>8</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Highschool student</td>
<td>4</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>HR and Admin</td>
<td>4</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>4%</td>
<td>1 not-for-profit, 1 citizen journalist, 3 conference staff, 7 presenters</td>
</tr>
<tr>
<td>n/a</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>316</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The result from four hypothesis tests is summarized in
Table 3. The columns lists the two psychometric measures being evaluated, and row indexes either short term or medium term change. Detailed item by item results are found in Appendix A.
**Table 3. Summary of changes in self-efficacy and awareness-BGD**

<table>
<thead>
<tr>
<th></th>
<th>Self-efficacy</th>
<th>Awareness-BGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>Paired-t-test with FPC (n = 135, Δ = 1.27 (2.28))</td>
<td>Paired-t-test with FPC (n = 113, Δ = 0.97 (3.84))</td>
</tr>
<tr>
<td>(post – pre)</td>
<td>p-value &lt;&lt; 0.01</td>
<td>p-value &lt; 0.01</td>
</tr>
<tr>
<td>Medium term</td>
<td>Paired-t-test (n = 33, Δ = 0.42 (2.55))</td>
<td>Paired-t-test (n = 32, Δ = 1.46 (3.41))</td>
</tr>
<tr>
<td>(follow-up – pre)</td>
<td>p-value = 0.34</td>
<td>p-value = 0.02</td>
</tr>
</tbody>
</table>

**Discussion**

The results of our study show that, overall people who attend CC2013 experienced positive changes in self-efficacy and awareness-BGD in the short term that are statistically significant. Recall that self-efficacy is correlated with career persistence, and awareness-BGD addresses an important barrier for women in STEM in general; our result indirectly suggest that CC2013 had a positive impact on women’s participation and persistence in STEM.

After six months, however, there was some evidence of improved awareness-BGD, but no evidence of lasting improvement in self-efficacy. This is likely due to competing confounding factors that we cannot control, such as obstacles and challenges in participants’ daily lives that diminished the effects of increased self-efficacy. This observation has an important implication in the design of interventions for women in STEM. Much of the existing research on the effects of STEM interventions tests the hypothesis that interventions improve self-efficacy for women in STEM. These studies focus on the effects of one-shot intervention on short term self-efficacy, e.g. immediately post intervention (Betz and Schifano, 2000; Dawes et al., 2000), or at four weeks’ time (Luzzo et al., 1999). However, our study is one of the first to explore the persistence of increased self-efficacy six months post intervention. The lack of persistence after six months may indicate that the one-shot intervention format, on its own, is not well suited to increasing self-efficacy, and that other intervention targets are more suitable for long-term outcomes of these type of events.

Of course, it is not possible to show a causal relationship between the attendance at a STEM conference and the measured changes. We examine a number of potential explanations for the observed changes, also known as confounding factors. First, we believe that during the conference the participants did not experience external influences, e.g. a competing intervention, given the short time-frame of eight hours that separated the pre and post surveys. However, a phenomenon known as “response-shift bias” - the change in the participants’ metric for answering questions from the pre-test to the post-test due to a new understanding of a concept being taught (Klatt and Taylor-Powell, 2005) - cannot be ruled out completely. The use of a
retrospective pre-test design could prevent response-shift bias (Howard and Dailey, 1979), but incurs further problems such as: recall bias, social desirability, effort justification, and cognitive dissonance (Colosi, 2006). Had we chosen a retrospective-design, the problem of social desirability and effort justification could not be ignored. Some research reports that response-shift bias in pre-post design led to more conservative p-values and estimated effects, compared to a retrospective design (Rohs and Langone, 1997; Rohs et al., 2001). In our study context, we believe conservatism on concluding statistical significance to be a benign error, and thus the pre-post design remained the better option.

We believe the chance of volunteerism bias occurring in the measured short-term changes is also low. First, our post-test sample was highly representative of the whole participating population (~50%) given its voluntary nature. Secondly, our staff deduced that the reduced participation in the post-event survey was likely due to other personal commitments at the end of the day, as the conference was held on a Saturday. This factor is not related to self-efficacy, nor awareness-BGD, thus we do not have an indication of volunteerism bias. While a larger drop-out in participation was observed for the follow-up survey, 33 respondents completed a follow-up survey out of 80 who consented to be contacted – an excellent participation rate. Furthermore, we found that whether a person responded to the follow-up survey or not did not correlate with the self-efficacy score (p-value = 0.24), nor with the awareness-GBD score (p-value = 0.73) at the closing of the intervention (see Appendix B).

As the follow-up survey was administered over the internet, we had no means of guaranteeing that participants had intentionally learned the correct answers to the awareness-BGD knowledge testing questions for the purpose of survey completion. However, we note that the majority of questions that were unrelated to awareness-BGD knowledge also showed positive changes in the follow-up surveys (see Appendix A).

We note that the evaluation framework itself potentially offered value-added for our conference aside from enabling better reporting to stakeholders. The use of the awareness-BGD instrument, which in part measures a person’s intention and belief toward advancing gender diversity in the technical workplace, potentially creates a mere-measurement effect on participants’ future behavior. The mere-measurement effect is a change in the future behavior of a person who is asked to self-report on either attitude, intention or belief towards a subject (Sprott et al., 2006; Chapman, 2001; Godin et al., 2008). In the context of the awareness-BGD survey, the effect of mere-measurement may result in a changed behavior relating to the attendance of events related to gender diversity, participation in advocacy, and public support for actions increasing gender diversity. We are unable to confirm nor reject this conjecture as it is outside of the scope of this study, but recognize the potential for future work.

Lastly, positive results achieved at CC2013 serve as evidence in support of using STEM conference as a tool for increasing gender diversity in STEM. Furthermore, as a tool for creating change, we believe the evaluation framework detailed in this paper could serve well as a
measurement standard for future STEM conference since it utilizes a collection of standardized procedures, instruments, tests for establishing impact. An adoption of this framework in future conferences will enable a more consistent comparison on the effects, necessary for identifying best practices.

Conclusion

In this paper, we present the first documented evaluation framework for a STEM conference type intervention and demonstrate its impact on women’s participation and persistence in STEM. We did this through targeting and measuring two proxy measures, career self-efficacy and the awareness of the benefit of gender diversity (awareness-BDG) in the workplace, which are correlated to women’s participation and persistence based on theory and empirical evidence. We targeted self-efficacy and awareness-BGD through embedded messaging, and measure them with a pre-post-follow-up evaluation design to capture both short term and medium term effects while minimizing the chance of bias.

We applied this evaluation framework to a conference, Creating Connections 2013, and found that it succeeded in positively impacting both self-efficacy and awareness-BGD in the short term, confirming the value of our intervention to women’s participation and career persistence. Furthermore, despite being a short-term event, our conference produced an increase in awareness-BGD that persisted at least six months after the conference ended. This suggests that short-term interventions may create sustained impact after its conclusion for certain constructs.

This study is a first investigation on the value of conference to women’s in STEM based on two measures only, which is by no means an exhaustive exploration. Future work lies in identifying and evaluation other constructs related to women’s participation and persistence in STEM. In particular we hope to compare the sensitivity to change and duration of impact sustained by the various constructs, to identify the most effective set of programming goals for a conference type interventions. We also hope extend the comparison to other interventions to select the most effective programming target for other types of intervention activities.

Furthermore, program design can also largely influence the sensitivity to change and duration of impact sustained by different constructs being evaluated. In our conference we addressed the selected conference objectives with an embodied learning approach and without any comparison cases. We hope to test out other approaches to program designs in the future to understand of how program design affects the duration of conference impact. Only with an understanding of both “what to target in an intervention” and “how to target” can we ensure that resources are spent efficiently for the best sustained effect to increase women’s participation and persistence in the field of science, technology, engineering, and mathematics.
### Appendix A

**Table 4. Summary of survey results on self-efficacy**

<table>
<thead>
<tr>
<th>Career Self-efficacy items</th>
<th>Short Term Change</th>
<th>Medium Term Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can remain calm when facing difficulties in my job because I can rely on my abilities.</td>
<td>0.26 0.60</td>
<td>0.21 0.93</td>
</tr>
<tr>
<td>When I am confronted with a problem in my job, I can usually find several solutions.</td>
<td>0.10 0.61</td>
<td>0.06 0.83</td>
</tr>
<tr>
<td>Whatever comes my way in my job, I can usually handle it.</td>
<td>0.14 0.65</td>
<td>-0.21 0.72</td>
</tr>
<tr>
<td>My past experiences in my job have prepared me well for my occupational future.</td>
<td>0.18 0.91</td>
<td>0.12 0.82</td>
</tr>
<tr>
<td>I meet the goals that I set for myself in my job.</td>
<td>0.22 0.65</td>
<td>0.21 0.65</td>
</tr>
<tr>
<td>I feel prepared for most of the demands in my job.</td>
<td>0.36 0.83</td>
<td>0.03 0.98</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.27 2.28</td>
<td>0.42 2.55</td>
</tr>
</tbody>
</table>

**Table 5. Summary of survey results on Awareness-BGD**

<table>
<thead>
<tr>
<th>Awareness-BGD items</th>
<th>Short term change</th>
<th>Medium term change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am likely to attend gender diversity workshops in the future.</td>
<td>a 0.08</td>
<td>1.13 0.18</td>
</tr>
<tr>
<td>Companies should not actively promote gender diversity in the workplace.</td>
<td>e 0.20</td>
<td>1.51 0.36</td>
</tr>
</tbody>
</table>
Companies should spend more resources toward creating a gender diverse workplace.

Within my current knowledge, I know where to find information on how I can help advance gender diversity.

Gender diversity in the technical workplace benefits society on a:

<table>
<thead>
<tr>
<th>Level</th>
<th>Action (a)</th>
<th>Empathy (e)</th>
<th>Knowledge (k)</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal level</td>
<td>e</td>
<td>0.04</td>
<td>1.25</td>
<td>0.03</td>
</tr>
<tr>
<td>Interpersonal level (e.g. when interacting with people around us)</td>
<td>a</td>
<td>0.52</td>
<td>1.31</td>
<td>0.54</td>
</tr>
<tr>
<td>Corporate level</td>
<td>e</td>
<td>-0.03</td>
<td>0.90</td>
<td>-0.03</td>
</tr>
<tr>
<td>National level</td>
<td>e</td>
<td>-0.03</td>
<td>0.95</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

Are the following items a result of increased gender diversity in the workforce for technical industries?

<table>
<thead>
<tr>
<th>Item</th>
<th>Action (a)</th>
<th>Empathy (e)</th>
<th>Knowledge (k)</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to foreign markets</td>
<td>k</td>
<td>-0.23</td>
<td>0.81</td>
<td>0.00</td>
</tr>
<tr>
<td>Access to a broader talent base</td>
<td>k</td>
<td>0.08</td>
<td>0.30</td>
<td>0.06</td>
</tr>
<tr>
<td>Increase in innovation potential</td>
<td>k</td>
<td>0.04</td>
<td>0.27</td>
<td>0.03</td>
</tr>
<tr>
<td>Increase in cash reserves</td>
<td>k</td>
<td>-0.03</td>
<td>0.77</td>
<td>-0.09</td>
</tr>
<tr>
<td>Increase in cost of staffing</td>
<td>k</td>
<td>0.17</td>
<td>1.03</td>
<td>0.06</td>
</tr>
<tr>
<td>Solution to skill shortages</td>
<td>k</td>
<td>0.05</td>
<td>0.69</td>
<td>0.09</td>
</tr>
<tr>
<td>Enhanced market development</td>
<td>k</td>
<td>0.11</td>
<td>0.60</td>
<td>0.24</td>
</tr>
<tr>
<td>Stronger financial performance</td>
<td>k</td>
<td>0.07</td>
<td>0.81</td>
<td>0.39</td>
</tr>
<tr>
<td>Greater return on human resource investment</td>
<td>k</td>
<td>-0.03</td>
<td>0.72</td>
<td>0.00</td>
</tr>
</tbody>
</table>

| Weighted* TOTAL                          | 0.97       | 3.84        | 1.46          | 3.41        |

* Weighted total is calculated by rescaling each of the 3 subcomponents (action (a), empathy (e) and knowledge (k)) such that each contribute 10 marks to the total score.
Appendix B

In Appendix B we provide a summary of the observed correlation between responding to the follow-up survey and self-efficacy score, and for the correlation between responding to the follow-up survey and awareness-BGD score. Sample correlation coefficients were calculated, along with 95% confidence interval on the true correlation coefficients and the p-value from the test for Pearson’s correlation coefficient on the hypothesis that the true correlation is 0. This result is summarised in Table 6.

Table 6. Correlation between a respondent’s participation in the follow-up survey and his/her psychometric measurements at post-event

<table>
<thead>
<tr>
<th>Status as participating in the follow-up survey (yes/no)</th>
<th>Self-efficacy at post-event</th>
<th>Awareness-BGD at post-event</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=152; r = -0.096; 95%CI [-0.25, 0.06]; p-value* = 0.24</td>
<td>n=147; r= -0.34; 95%CI [-0.19, 0.13]; p-value* = 0.73</td>
<td></td>
</tr>
</tbody>
</table>

*Test of Pearson's product moment correlation coefficient
References


Author citation (forthcoming), “Short instrument on the public awareness of the benefits of gender diversity for assessing the level of valuation of gender diversity”.


APPENDIX 14:

INSTRUMENT: AWARENESS OF THE BENEFITS OF GENDER DIVERSITY, WITH SCORING INSTRUCTIONS
PUBLIC AWARENESS OF GENDER DIVERSITY INSTRUMENT

ORIGIN
This instrument was developed to measure public awareness of gender diversity (awareness-bdg) by Vivian Meng, Dr. Elizabeth Croft and Jennifer Pelletier. Survey items were generated in consideration of practicality, transferability, and sensitivity. They were reviewed first by a panel of experts, and then by end-users in a pilot study. To validate the instrument, we conducted studies with volunteer participants to assess the instrument’s internal reliability, construct validity, test-rest reliability, and sensitivity to change. Studies were approved by UBC Behavioural Ethics Board.

HOW TO USE
The instrument can be found at the end of this document. It should be administered in a pre-post comparison, or as a pre-follow-up comparison. Note that the pre administration should take place before the participant encounters any programming (i.e. before a workshop session begins).

IDENTIFIER
To match pre, post and follow-up responses from the same individual, we designed a self-generated identifier section for the instrument. In this section, participants are asked to volunteer a number of pieces of information about oneself without divulging his or her identity. To preserve survey length, we chose a medium-length self-generated identifier code, containing the following seven components: gender identity, birth month, middle initials, year of graduation from high-school, first three letters of father’s first name, first three letters of mother’s first name, and last four digits of primary phone number.

When comparing the matches, we used the Levenshtein similarity function (Borg, 2013) which produced a value between 0 and 1 as an indication of degree of similarity (see scoring instructions for details). As an example of the matching process, we compared a self-generated code from the post-event surveys against all self-generated identifiers from the pre-event surveys using the Levenshtein similarity function; the pre-event identifier that had the highest similarity value was taken as the match. To avoid false matches, we required a minimum similarity of 0.6 before a match was declared. The minimum similarity requirement was strict enough that a manual inspection of declared matches showed no sign of false matches.

For use with a younger audience, you could omit the high school graduation year from the identifier. For same-day audiences when you do not intend to follow up at a later date, you can apply a random identification number sticker to the back of name tags as participants arrive.

SCORING
The instrument contains items on three sub-scales – knowledge (max 18), action (max 8), and empathy (max 24). A weighted total score is calculated by rescaling each of the 3 subcomponents (action, empathy, and knowledge) such that each contributes 10 marks to the total score. The table on the following page indicates which sub-scales each item contributes to.
<table>
<thead>
<tr>
<th>Sub-Scale</th>
<th>1 Strongly disagree</th>
<th>2 Disagree</th>
<th>3 Neutral</th>
<th>4 Agree</th>
<th>5 Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am likely to attend gender diversity workshops in the future.</td>
<td>Action</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Companies should not actively promote gender diversity in the workplace.</td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Companies should spend more resources toward creating a gender diverse workplace.</td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Within my current knowledge, I know where to find information on how I can help advance gender diversity.</td>
<td>Action</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Personal level</strong></td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Interpersonal level</strong></td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Corporate level</strong></td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>National level</strong></td>
<td>Empathy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*All items in the table below are scored on the knowledge sub-scale:*

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to foreign markets</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>Solution to skill shortages</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Access to a broader talent base</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>Enhanced market development</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Increase in innovation potential</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>Stronger financial performance</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Increase in cash reserves</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>Greater return on human resource investment</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Decrease in cost of staffing</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>Other: Qualitative Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Scoring for the Awareness-BGD instrument. The total weighted score represents each sub-scale equally:*

Total Weighted Score = (KnowledgeScore / 18 * 10) + (ActionScore / 8 * 10) + (EmpathyScore / 24 * 10)
The hypothesis being tested is that participation in your intervention resulted in an increase, short-term or long-term, in awareness-BGD for all the participants on average. To show short-term effect compare the paired results between the pre-survey and the post-survey, based on the total score of survey items. To show long-term effects compare the pre-survey and follow-up survey.

To test for an effect, use a 2 sided, paired-t-test. The t-test allowed us to conclude if on average, a person’s score at a later time differed from a person’s score at an earlier time.

For other questions on scoring, please contact the primary correspondent for the paper, Vivian Meng at vivian.meng@mail.mcgill.ca.

RESULTS REPORTING

A boxplot is recommended for graphing your results. A box-and-whiskers plot provides a visual display of change:

- The quartiles of the scores are represented by the area above the box, the top half of the box, the bottom of the box, and the area below the box;
- The box illustrates the experience of half of the respondents, while the whiskers show the extremes;
- The movement of the line shows the change in the median score;
- The movement of the red dot shows the change in the average score.

The scoring of “What benefits do increased gender diversity in the workforce offer technical industries?” is done qualitatively. This question includes detractors to see how well attendees understand the benefits of gender diversity.
AWARENESS OF THE BENEFITS OF GENDER DIVERSITY INSTRUMENT

Intervention:  
Date:  

Unique Identifier:  

<table>
<thead>
<tr>
<th>Birth month (numerical)</th>
<th>Middle initial(s)</th>
<th>Year of grad. from high-school</th>
<th>First 3 letters of father’s first name</th>
<th>First 3 letters of mother’s first name</th>
<th>Last 4 digits of primary phone number</th>
</tr>
</thead>
</table>

Gender:  
- ☐ Female  
- ☐ Male  
- ☐ Other  
- ☐ Do not wish to disclose

Please rate your agreement with the following items:

<table>
<thead>
<tr>
<th>1 Strongly disagree</th>
<th>2 Disagree</th>
<th>3 Neutral</th>
<th>4 Agree</th>
<th>5 Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am likely to attend gender diversity workshops in the future.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Companies should not actively promote gender diversity in the workplace.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Companies should spend more resources toward creating a gender diverse workplace.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within my current knowledge, I know where to find information on how I can help advance gender diversity.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gender diversity in the technical workplace benefits society on a:

<table>
<thead>
<tr>
<th>1 Strongly disagree</th>
<th>2 Disagree</th>
<th>3 Neutral</th>
<th>4 Agree</th>
<th>5 Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal level</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Interpersonal level | 1 2 3 4 5 | (e.g. when interacting with people around us)
| Corporate level     | 1 2 3 4 5 | |
| National level      | 1 2 3 4 5 | |

What benefits do increased gender diversity in the workforce offer technical industries?
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't know</th>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't Know</th>
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<tbody>
<tr>
<td>Access to foreign markets</td>
<td></td>
<td></td>
<td></td>
<td>Solution to skill shortages</td>
<td></td>
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<tr>
<td>Access to a broader talent base</td>
<td></td>
<td></td>
<td></td>
<td>Enhanced market development</td>
<td></td>
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<tr>
<td>Increase in innovation potential</td>
<td></td>
<td></td>
<td></td>
<td>Stronger financial performance</td>
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<tr>
<td>Increase in cash reserves</td>
<td></td>
<td></td>
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<td>Greater return on human resource investment</td>
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<td></td>
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<tr>
<td>Decrease in cost of staffing</td>
<td></td>
<td></td>
<td></td>
<td>Other:</td>
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