

RETAINING WOMEN IN ENGINEERING

*Prepared by the York University Women in
Engineering Research Team*

ACADEMIA AND INDUSTRY
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PURPOSE

This report outlines the results from a 2018 study on the experiences of engineers in academia and in industry. The focus of the study was on the successful retention of women in the engineering field.

Recruitment and retention are two separate but equally important issues for diverse and inclusive representation of the public in engineering. Equal representation and diverse voices are needed for spurring innovative solutions and effective conversations in the workplace. While there is ongoing work on recruitment of diverse voices into engineering, there is less work being done on their retention throughout their careers.

There still exists a problem of women leaving engineering at higher rates than men. The York University Women in Engineering Research Team has been dedicating the past two years to studying possible causes of this, in an effort to create a timeline of women's experiences. This timeline, backed by locally relevant Canadian research, will serve as a point of reference for understanding where and what key interventions are needed at different stages of a woman's career in engineering. The overall project on retention includes probing into retention issues as early as undergraduate studies and examines engineers' experiences beyond their initial degree in both academia and industry.

The purpose of this report is to focus on insights gained from listening to academics and industry professionals who have been successfully retained. We asked the question: **What approaches are effective at improving the retention of women in engineering?**

APPROACH

INTERVIEWS

We began our research by interviewing women in academia and industry, as well as diversity champions from various institutions.

SURVEYS

We created a **28-question survey for women in academia** and a **32-question survey for women in industry**, focusing on understanding what has made them successful. We then tweaked and opened up the surveys to any gender, all from across Canada.

We received 208 responses from industry representatives and 126 responses from academics.

TOTAL: 334 responses

ANALYSIS

For the categorical questions, we used the **chi-square statistical test** to examine the relationships between different categorical variables (e.g., career intentions and collaboration, seniority and project flexibility, etc.).

For questions that involved numerical values, we used the **ANOVA (Analysis of Variance)** statistical test to examine the differences between average reported scores (e.g., level of transparency of institution, confidence that an institution would provide support after a leave).

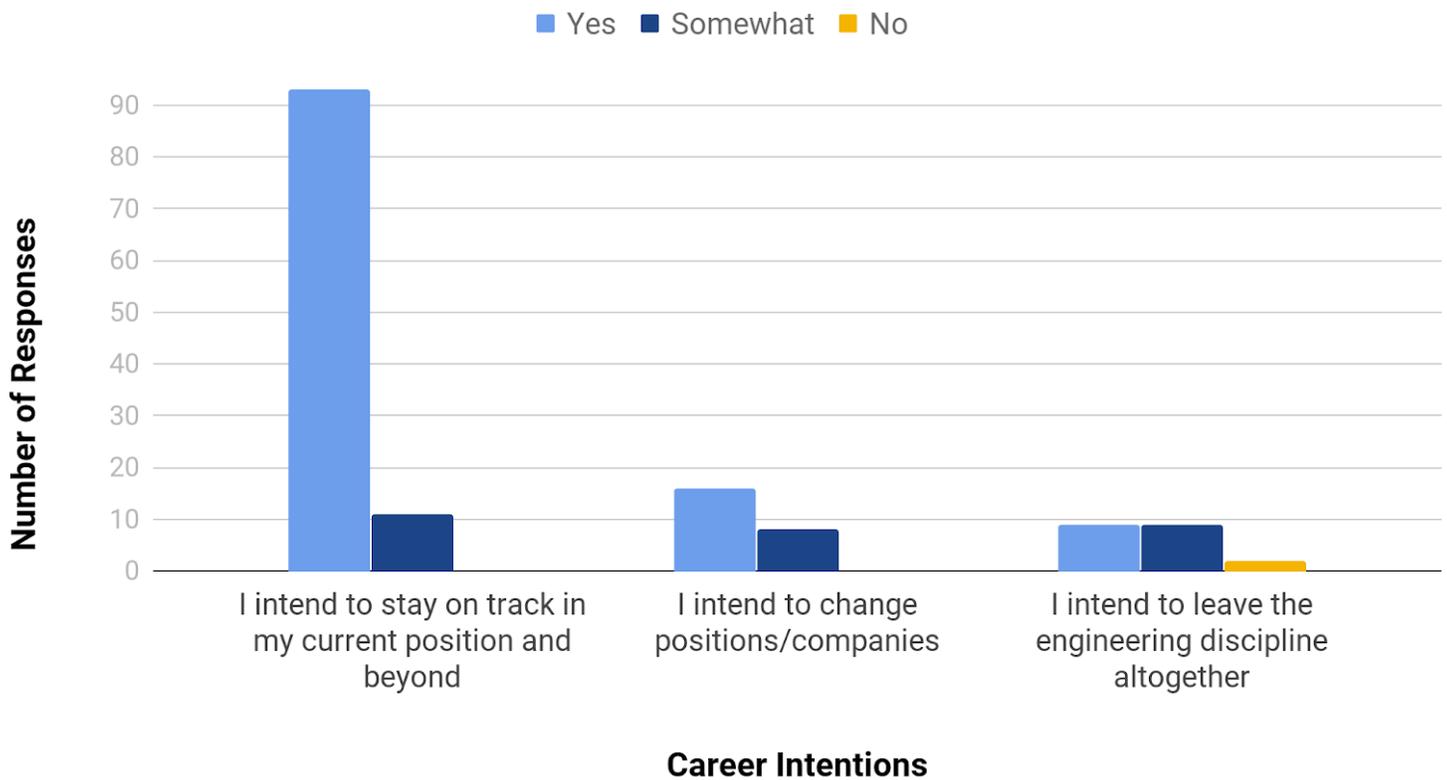
Finally, we analyzed the comments from the open-answer and comment questions for major themes and to gain a deeper qualitative understanding of our quantitative data.

FINDINGS

WHAT IS SHARED BY ACADEMIA AND INDUSTRY

- One's intention to stay in engineering was linked to collaboration. A workplace environment encouraging of collaboration was reported more often alongside an intention to stay in one's current engineering position.

Are you comfortable and encouraged to collaborate with others in your work?



- How well a company/institution was perceived to support people (women especially) returning from parental leave was linked to one's intention to stay in engineering. People who were more confident in and trusted their workplace to support a smooth transition when they returned from parental leave tended to indicate that they would continue their engineering career.

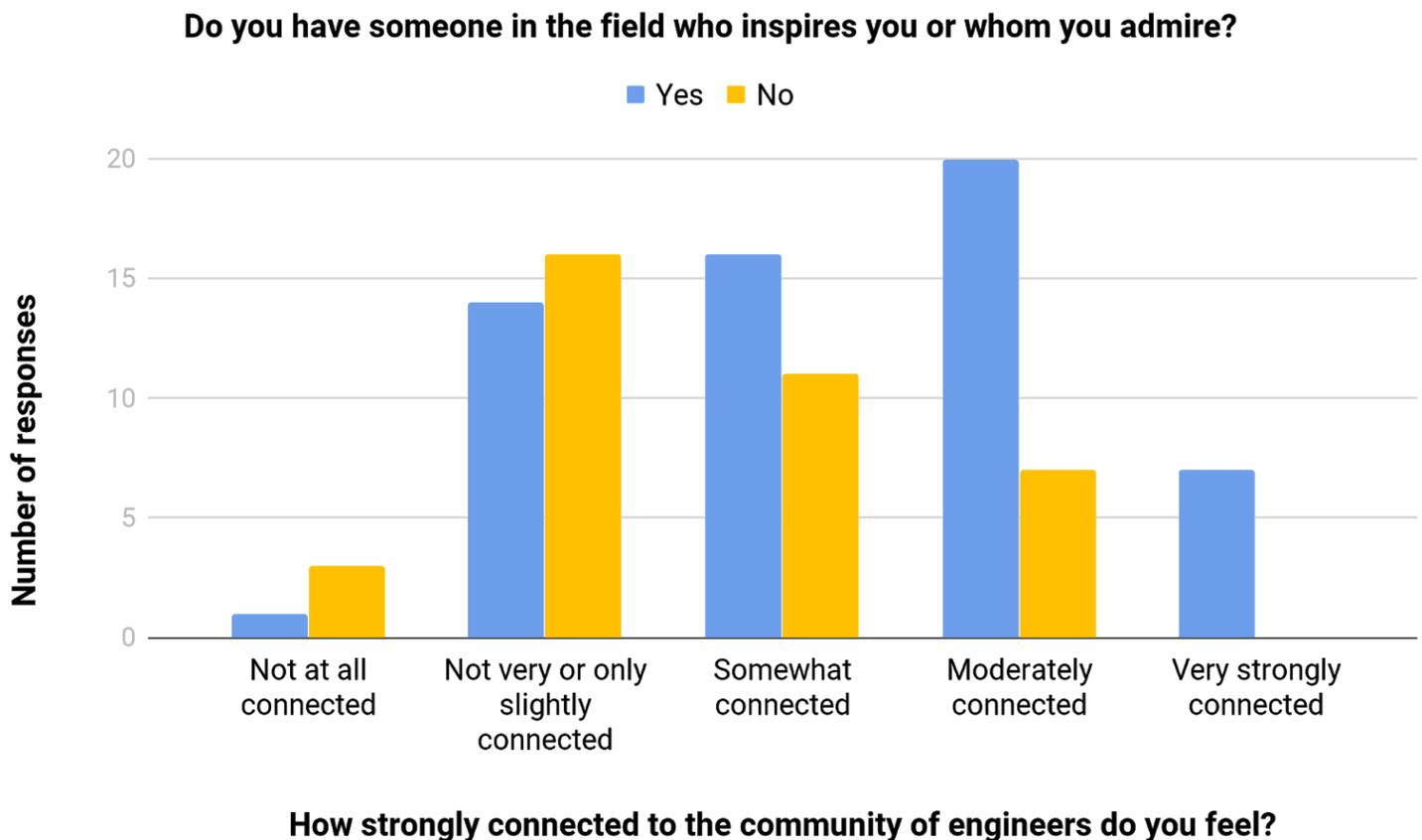
FINDINGS

WHAT IS SHARED BY ACADEMIA AND INDUSTRY

- The respect received from juniors, particularly for women, was low until one was in a particularly high position of seniority. Even in some positions of seniority, women were not given adequate respect until they were particularly high up in rank. The importance of investing in retention efforts early in an employee's career can be seen here.

INDUSTRY-SPECIFIC FINDINGS

- Women in industry feel more connected to the community of engineers when they have someone in the field who inspires them. Role models are important - any engineer that one can connect to and other engineers who are women that have gone through their careers successfully.



FINDINGS

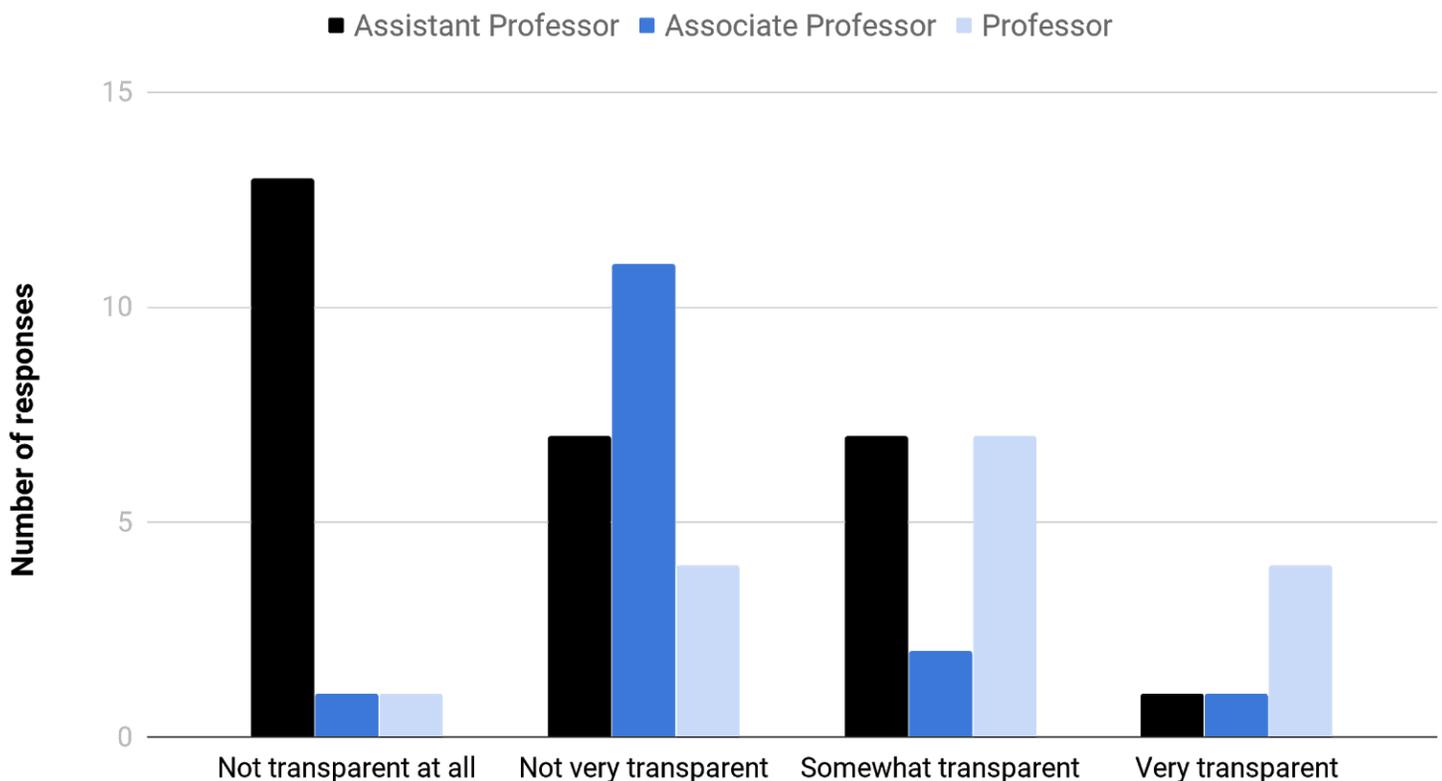
INDUSTRY-SPECIFIC FINDINGS

- Companies tended to be transparent about benefits packages, but not as transparent about employee salaries, how getting a P.Eng exempts engineers from the Employee Standards Act, or how to advance one's career. Transparency on the latter items is especially important when employees are looking to pursue higher opportunities.

ACADEMIA-SPECIFIC FINDINGS

- Higher seniority was related to increased institution transparency about opportunities for career advancement.

Seniority and Level of Transparency of Institutions Regarding Career Advancement Opportunities



FINDINGS

ACADEMIA-SPECIFIC FINDINGS

- Generally, academic institutions were more transparent than companies in industry on all career-related items.
- Academics reported receiving adequate respect from everyone, with the highest respect coming from students and lowest from superiors.



RECOMMENDATIONS

We held a follow-up workshop on November 10th, 2019, to discuss our research results in more detail and to brainstorm next steps for continuing to foster women's successful retention in engineering.

The following major recommendations emerged.

GENERAL

Be explicit in communication and transparent

- Clear career path and what is needed at each stage of promotion
- Easy-to-find and easy-to-access information about career options
- Formal professional development and skill-building workshops that clearly state their goals and how they tie in to the career ladder
- Informal meeting sessions (lunches or social networking events) to discuss questions about advancing one's career

Implement followup and accountability measures

- Yearly or quarterly inquiries into whether diversity/inclusivity interventions are working
 - Set goals and recommendations for achieving those goals, with rewards for reaching them and/or penalties for not reaching them
 - Inquiries can be focus groups, surveys, interviews, etc.
 - All engineers should participate (i.e., not just women and minorities)
- Implement anonymous feedback, throughout the entire process (i.e., not just at the end)
- Involve potential participants in event planning

RECOMMENDATIONS

GENERAL

Have a national diversity and inclusion network with regional teams instead of a single diversity/inclusion person

- For large companies, connect people throughout the company on gender diversity topics and schedule events focused on supporting the growth and success of employees in the company
- For small companies, connect with other small companies
- For university institutions, intra- and inter-university partnerships could be a way for academics to connect with each other

Create a family-friendly workplace

- Summer camps for children or opportunities to bring a child to work, potentially also as an outreach initiative
- Allow flexibility of hours and project choice, when possible
- Have a team-based work environment with horizontally-delegated responsibilities as opposed to vertical power relationships and immutable titles within the team
 - Ensure that parental leave policies are fair and that there is support for returning to work after leave

Be careful to make job descriptions gender-neutral, including for internal positions and promotions

Implement an automatic annual pay increase as skills develop

RECOMMENDATIONS

INDUSTRY

Allow for P. Eng timing flexibility

- Create supports for pursuing a P.Eng and family at the same time
- Allow part-time or extended period to work on P.Eng application

ACADEMIA

Hire post-doctoral students to take on work (especially important when on leave)

Find or create funding for activities in the community (e.g., outreach initiatives, professional development projects, community partnership projects)

Make tenure applications, promotion applications, and work reports shorter and more frequent

- Give more frequent feedback and allow more frequent updates of information and records



RESOURCES

The following resources can get you started on addressing diversity, inclusion, and equity issues at the workplace. Whether you are an employer or an employee, these may help you address the recommendations outlined in this report. Remember that what works for one institution may not work for another. Listen to the success stories within your institution.

- PEO (Professional Engineers Ontario) and Engineers of Tomorrow run the Engineers in Residence (EIR) program for new hires
 - Catalyst Canada has numerous diversity and inclusion programs employers can opt in to
 - Provincial and local networks such as OSPE (Ontario Society of Professional Engineers), WIE (Women in Engineering), and SWE (Society of Women Engineers) run events all year 'round on topics related to career advancement and skill-building
 - Post-secondary institutions often run their own diversity and inclusion events as well as intra-disciplinary networking and skills-building workshops
 - General STEM initiatives like DiversifySTEM have great general resources for encouraging equity in STEM fields like engineering
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