Improving Female Enrolment in STEM-Related Trades

Jill Ferguson

Abstract

In 2014, the provincial government of Manitoba announced new initiatives to encourage young women to explore a career in non-traditional trades. While new government funding programs and job opportunities are laudable, there will not be a significant increase of female enrolment in Science, Technology, Engineering and Mathematics (STEM) fields unless our early, middle, and high school curricula are revamped to include experiential learning that demystifies STEM careers. Additionally, there is a need for long-term initiatives that empower young girls to explore education in all fields of study, provide gender-neutral learning environments, and encourage businesses to create gender-balanced workplaces.

On October 2, 2014, Manitoba Minister of Jobs and the Economy, Theresa Oswald, announced three new initiatives to encourage women and girls to explore careers in non-traditional trades. The three initiatives consisted of the Trade Up! Program, which will provide guidance, testing, and financial aid to those women who are interested in trades; the training of 12 certified female journey people to become vocational educators; and a pre-apprenticeship cooperative program to be delivered by the International Brotherhood of Electrical Workers (IBEW), which will hold 10 spots in reserve for female participants (Province Hopes, 2014, paras. 1-7). While these initiatives as set out by the Manitoba government as a means to encourage women and girls to explore careers in non-traditional fields are laudable, they will not be successful unless they are married to other long-term initiatives that empower young girls to explore education in all fields of study, include hands-on learning that eschews gender socialization, and encourage businesses to create gender-balanced workplaces.

Eliminate the Concept of Gender-Specific Jobs

Currently in Canada, less than one-third of females obtain a post-secondary degree or diploma in the Science, Technology, Engineering and Mathematics (STEM) fields, yet women account for more than 50% of all post-secondary graduates (Muzzafar, 2014, “Strength in Numbers,” paras. 2-3). This low enrolment and subsequently low graduation rate of women in STEM fields may be attributed to the persistence of gendered curricula in the Canadian school system, which still makes a distinction between men’s and women’s jobs (Ingram, 2014). The lack of exposure to what are traditionally male-dominated STEM fields at a young age may explain why there continues to be low female enrolment in the trades and technology domains. Exposure to trades and technology at an early age is one way to encourage girls to consider post-secondary education in a STEM domain (STUDENTS, 2014).

Gendered curricula and lack of exposure to STEM fields of study are not the only barriers to female participation in trades and technology. Parental pressure may be the main reason that stops women from investigating a career in STEM (Walters, 2013). Many parents believe that manufacturing in Canada is on life-support, so they do not know about, and therefore cannot speak to, their daughters about the opportunities for exciting and well-paying careers in STEM-related fields. On average, a woman in Canada enters the trades at age 29, after she has already explored other careers outside of the STEM fields. These additional barriers highlight a need for a national program that emphasizes not only the monetary rewards that await women who enter into STEM careers, but also the chance for personal growth, especially since a woman’s expository nature and creativity are a good match for the innovative manufacturing sectors (Walters, 2013).

Perhaps the largest obstacle to more young women entering a STEM or trades career revolves around the well-worn trope that women are not suited for what has traditionally been considered men's work. The long-held idea that women's emotional, feminine natures do not gibe with the rational, scientific personality needed for STEM, nor do women's soft and weak physicality apply well to the strength needed for trades work, is reinforced by some disheartening statistics. In Canada, fewer than 4% of women are employed in the construction trades and even fewer are employed in other skilled trades (Sorenson, 2014, para. 2). These low numbers can in part be attributed to the notion that women possess a feminine weakness that makes them ill-suited to working in the masculine, "tough" trades environment (Ness, 2012, p. 663). When that perceived physical weakness is coupled with the concept that women in a male-dominated workplace cause an increase in distracted work practices, disruption to business, and an increase in harassment claims, one has the recipe for a very female-unfriendly work environment. It is of note that these barriers for women working in trades are slowly eroding: many women in these workplaces have reported to being treated as "just one of the guys" while also being recognized as valuable employees (Ness, 2012, p. 664). Furthermore, over the span of five years, enrolment in trades programs at Thompson River University in British Columbia has increased by 17%, due in part to administrators who have created a more respectful, genderless atmosphere in the university's shops and classrooms (Sorenson, 2014, paras. 29-34).

The Government of Manitoba's newly announced initiatives to increase female participation in STEM fields, while commendable, are simply not enough. There will undoubtedly be tens of women who enrol in or explore the trades, thanks to reserved training spots, but that number needs to be in the thousands. This increase of women in STEM fields will occur only when young girls and boys are exposed to early and middle school curricula that do not delineate between men and women's work. Young girls should be continuously encouraged to excel in science, technology, math and manufacturing fields, and we, as a society, must actively work together to disabuse the notion that jobs that have traditionally been performed by men are forbidden territory for women. There is a certain irony that the International Brotherhood of Electrical Workers (IBEW) is attempting to be inclusive by reserving 10 training spots for women, when that inclusivity could be better achieved by replacing the word *brotherhood* in its name with a more gender-neutral term. The province's plan to increase female participation in trades is a step in the right direction; however, it just scratches the surface of a problem that requires long-term attention from both the public and private sector.

Practise Non-Gendered, Experiential Learning

Despite the Government of Manitoba's belief that its newly announced efforts to increase the participation of females in trades will be easily achieved, a noticeable appreciation of women in the field will not be seen until the provinces of Canada modify how curricula are taught to all students. When surveyed, a group of Toronto-area high school students noted that most of their studies treated gender equality as a non-issue in Canada. This belief existed despite the overwhelming feeling that discussions regarding women's contributions to society took place only when they were studying early Canadian settlers, suffragettes, or sex education (Ingram, 2014). This lack of acknowledgement of the skills, aptitudes, and contributions of current and historical female figures outside of three instances, combined with the pressure to conform to traditional mores of femininity, created tension for several of these girls as they tried to figure out their own identities. A more gender-balanced teaching of early, middle, and high school curricula could go a long way to lessening the confusion that many young females experience when trying to determine what might be their future careers.

This confusion was shown in the remarks made by a level one pre-employment carpentry student who, in the spring of 2014, asserted that despite her lifelong interest in carpentry, she would not have enrolled in the program had it been open to men. The female student's

apprehension about enrolling in the program was based on the belief that men would enrol and be better equipped with prior knowledge of carpentry practices, leaving her at an academic and practical disadvantage (Migneault, 2014). While it is admirable that a women-only class was created to allay the fears of females who were anxious about embarking on a career in male-dominated trades, these segregated learning environments should not have to exist. Early, middle, and high school curricula should provide a balanced perspective of the abilities and achievements of both genders, lessening the perception that women who have created societal change and have contributed to the growth of our communities through science, technology, engineering, and manufacturing are the exception as opposed to the rule.

Unfortunately, the delivery of curricula without favoring one sex over another will not occur overnight. In the interim, however, several programs have been developed to present the possibilities of STEM careers to young women. Girls in Engineering, Mathematics, and Science (GEMS) is a program that has been developed by female scientists and their students in the United States (Dubetz & Wilson, 2013). Unlike their male coworkers, these women were not encouraged to explore the science and math fields. This shortfall led the women to create a succession of GEMS workshops that offer middle school girls the opportunity to explore STEM careers. Presented in an all-female environment, GEMS workshops give young females the chance to experience and enjoy math and science without the fear of being seen as too intelligent and, therefore, less feminine. One of the many highlights of the GEMS program is the emphasis on experiential, hands-on learning, which helps to demystify the STEM field, aids in retention of learned material, and encourages young women to expand their academic horizons.

In Manitoba, Career Trek offers similar experiences for young boys and girls to experience hands-on learning experiences in a university, college, or apprenticeship environment ("Steps," n.d.). While it is equally important to encourage both genders to learn through expression and application (McCabe, 2014), programs such as Career Trek cannot be relied upon to compensate for the lack of gender-neutral curricula and experiential learning that is still largely absent in early, middle, and high schools. Student success depends on student engagement, and engagement relies on well-structured pedagogy and teaching practices that support the learning process through the student's entire educational career (Gottheil & Smith, 2011). If those in the STEM fields in Manitoba wish to engage under-represented student populations, they must place pressure on the province to institute a curriculum that places less significance on a gender-driven narrative, while emphasizing the importance of experiential learning through hands-on demonstrations that provide real-life applications for all students.

Emphasize the Benefits of Gender-Balanced Workplaces

Despite decades-long efforts to create a more gender-balanced leadership structure in many Canadian workplaces, it is a sad reality that, for most businesses, diverse leadership structures still do not occur naturally (Grogan & Shakecraft, 2011). This inequality exists despite research that indicates executive committees that have a balanced proportion of men and women have 56% higher revenues than those companies that have no women in their leadership structures (Muzzafar, 2014, "Strength in Numbers," para. 4). Even though increased profit makes a strong case for the inclusion of women in leadership roles, the persistence of gender socialization can erect barriers to full female engagement in those roles (Ingram, 2014). Nevertheless, these barriers are gradually being overcome; what was once a predominately hierarchical leadership model is gradually transforming into a more collaborative atmosphere for many businesses (Muzzafar, 2014), and gender-balanced teamwork at a leadership level is an excellent way to model successful working communities for all branches of a business (Blanchard, 2012). This gradual shift into a more cooperative leadership structure will undoubtedly have a trickle-down effect, whereby women in STEM fields are not seen as an anomaly but rather as valuable resource.

While the government has limited say as to whom a business can hire, or for what reasons, as a business itself the government can act as an exemplar by promoting competent women to leadership positions. This philosophy has already taken root at the Toronto Stock Exchange where, as of December 31, 2014, all listed companies are obliged to disclose all female representation on their boards of directors (Shecter, 2014). Endorsed by every province with the exception of Alberta, it is hoped that this initiative will increase shareholder analysis regarding how companies hire and advance women within their organizations. Although one may think that this obligation to disclose the amount of female representation at a high level of leadership borders on too much government interference, it is a powerful tool to compel multinational companies to think about diversity at every level of their corporate structure.

Conclusion

It is predicted that by 2016, Canada will be facing a shortfall of 100,000 STEM workers (Muzzafar, 2014, "Strength in Numbers," para. 3). For many women, this deficit could present a golden opportunity to embark upon a rewarding career in a well-paying field, but less than one-third of female graduates are in STEM-connected areas of study. This dearth of women in STEM education highlights the shortsightedness of the recent announcement by the Government of Manitoba of initiatives to increase female participation in trades and technology. Arranging career counselling, allocating training space, and providing education grants are noble plans that only superficially address the goal of increasing female interest in STEM training. For many women who investigate a career in STEM after high school, it is too little information, too late in their lives; they have not been encouraged to take the math or science needed to further their education and therefore do not have the qualifications to enter the discipline. STEM fields can be daunting if one is unfamiliar with experiential learning, has not been encouraged to excel in math and science, and has been witness to persistent sexism in business environments. That is why it is imperative that the government create programs that run during the early, middle, and high school years in order to demystify the misconceptions around STEM careers. Promoting the concepts of gender-neutral jobs, experiential learning, non-gendered curricula, and gender-balanced workplaces in schools and business is an effective way to normalize STEM careers and therefore increase female participation in this poorly staffed domain.

References

Blanchard, K. D. (2012). Modeling lifelong learning: Collaborative teaching across disciplinary lines. *Teaching Theology and Religion, 15*(4), 338-354.

Dubetz, T., & Wilson, J. A. (2013). Girls in engineering, mathematics and science, GEMS: A science outreach program for middle-school female students. *Journal of STEM Education: Innovations & Research, 14*(3), 41-47.

Gottheil, S., & Smith, C. (Eds.). (2011). *SEM in Canada: Promoting student and institutional success in Canadian colleges and universities.* Washington, DC: American Associates of Collegiate Registrars and Admissions Officers.

Grogan, M., & Shakeshaft, C. (2011). *Women and educational leadership*. San Francisco, CA: Jossey-Bass.

Ingram, L. (2014). Re-imagining roles: Using collaborative and creative research methodologies to explore girls' perspectives on gender, citizenship and schooling. *Educational Action Research*, *22*(3), 306-324. doi:10.1080/09650792.2013.872574.

McCabe, C. (2014). Preferred learning styles among college students: Does sex matter? *North American Journal of Psychology, 16*(1), 89-104.

Migneault, J. (2014, April 4). Organizers said women will need to fill the skilled labour gap. *Northern Ontario Business.* Retrieved November 9, 2014, from

http://www.northernontariobusiness.com/Industry-News/education/2014/04/Organizers-said-women-will-need-to-fill-the-skilled-labour-gap.aspx
Muzzafar, S. (2014). Canada's untapped economic powerhouse. *Maclean's*, *127*(10), 43-46.
Ness, K. (2012). Constructing masculinity in the building trades: "Most jobs in the construction industry can be done by women." *Gender, Work and Organization, 19*(6), 654-676. doi:10.1111/j.1468-0432.2010.00551.x.
Province hopes initiatives will help women enter trades. (2014, October 2). *Mytoba.ca.* Retrieved November 12, 2014, from http://mytoba.ca/news/province-hopes-initiatives-will-help-women-enter-trades/
Shecter, B. (2014, October 14). New rules should see "significant progress" in increasing women on boards of TSX-listed firms. *Financial Post*. Retrieved November 29, 2014, from http://business.financialpost.com/2014/10/14/new-guidelines-for-women-on-ontario-boards-coming-wednesday/
Sorenson, J. (2014, August 28). Women still not embracing a career in trades. *Journal of Commerce.* Retrieved October 10, 2014, from http://www.journalofcommerce.com/Labour/News/2014/5/Women-still-not-embracing-a-career-in-trades-JOC060317W/
Steps in the right direction. (n.d.). *Careertrek.ca.* Retrieved November 27, 2014, from http://www.careertrek.ca/AboutUs/Background.aspx
Students. (2014). *Chronicle of Higher Education, 60*(33), A19.
Walters, J. (2013, March 3). (Not enough) women at work. *The Hamilton Spectator.* Retrieved November 9, 2014, from http://www.thespec.com/news-story/2104599--not-enough-women-at-work/

About the Author

Jill Ferguson lives in Brandon, Manitoba, with her husband and a menagerie of cats and dogs. She is the Chairperson of Technology at Assiniboine Community College. A graduate of Trent University and Fanshawe College, Jill is currently enrolled in the Master of Education program at Brandon University, specializing in educational administration.