



Commemorating the **National Day of Remembrance and Action on Violence Against Women**

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A hundred years ago, a female engineering student was so rare that her very existence was considered newsworthy – she was as strange as a parrot on the subway.

In 1925, The University of Minnesota’s campus engineering magazine ran a story about the only two female students in the department. It’s headline was. “Co-ed engineers: man’s domains are again invaded.”

The two students were named Esther Knudson and Ursulla Quinn. Amy Sue Bix, a historian who found the campus article for her book “Girls coming to tech,” estimates there were probably only 200 female engineering students in the entire U.S. The University of Minnesota campus reporter wrote that when Esther and Ursulla first arrived in the department, male students in engineering classes heard “the click clack of women’s heels upon the tiles of man’s last retreat in the university,” and stood up to help the presumably lost women find where they were supposed to be.

Esther became the first civil engineer hired by Wisconsin’s highway commission. That was strange enough that this time the Milwaukee Journal picked up the story, writing about Esther and a female mining engineer named Emilie Hahn. The Milwaukee Journal’s headline was: “Wisconsin girl engineers LIKE their jobs. Miss Esther Knudson of the state highway commission and Miss Emilie Hahn, graduate mining engineer, attain success AND retain their feminine charm.” The accompanying photo noted that Esther was wearing pants.

When World War II hit and started draining engineering programs of male students, governments began programs to recruit more women. The number of women in engineering in the US rose from a couple hundred to a couple thousand.

But the welcome from the remaining male students didn’t get much better. A campus reporter at Purdue University wrote that “these fresh new faces are looked over carefully by a campus awaiting them for the past few weeks. Are they pretty or goons? Will they offer the regular co-eds” – that is, female students in non-engineering programs” – competition? Are they mannish girls with hair clipped short?” happily, he reported, “they are not.”

At Rensselaer Polytechnic, one of the oldest engineering schools in the United States, the reaction was the same. Under another headline that used the word “Invasion,” a student reporter wrote that “at first, our fighting engineers were wary over this feminine intrusion on the last of the male professions.....but day to day the gentlemen got a bit more accustomed to the sight of brunettes, red-headed, and what’s even worse, blond engineers. Day to day, the

cadettes – the female engineers – got used to the sight of drooling RPI men, and got a splendid education in cat calls, whistles, and stares.”

Not everyone appreciated these new recruits. At Iowa State, one man complained about the female engineers’ grubby working clothes. He called the pants-wearing women “a national menace,” and said that they “look like the devil...it’s a sacrifice of femininity, which any man in uniform resents.” At Cornell, a reporter wrote that “rumour has it that 17 women engineers are at Cornell. Do they build up morale or do they provide distraction? Are they taking advantage of the boy girl ratio in engineering, are they just trying to help the war effort, or do they want engineering careers?”

[[Here’s a picture from World War Two – these female engineering students are holding slide rules, and the caption says “No knitting or other sissy stuff for these five girls – they’re doing their bit for national defense in a manly way.”]]

Even though the number of women in engineering programs rose during World War Two, if tech-minded women had been waiting for a breakthrough, this wasn’t it. In fact, after the men returned from war, things got worse. The uptick in male enrollment made it harder for women to remain in these programs. One university administrator, pressed on whether the engineering program admitted women, said that “we are coeducational even though we don’t stress the fact because we don’t want too many gals around.”

Throughout the 1950s, the proportion of women in engineering degrees never rose above six tenths of one percent.

But in the 1960s, women began to organize, forming societies to represent the interests of female engineers. Activists developed programs to recruit and retain female students. Some of those activists defined themselves as feminists, part of the second wave feminism that grew over the 60s and 70s.

This organizing had an effect. In Canada, female enrollment in engineering grew steadily. In 1975, it sat at 3.6 per cent. In 1985, it was 10.8 percent. It would rise another 6 percent by the end of that decade.

This was the environment that Marc Lépine walked into when he walked into the École Polytechnique on December 6th, 1989. I’ll read you a small part of the Coroner’s report. And just a warning, it isn’t graphic but it is disturbing.

17:10, Lépine entered room C-230.4 and moved toward a student who was giving a presentation. Lépine was holding a rifle in both hands. He approached the student and said: “Everybody stop everything.” He suddenly fired a shot at the ceiling and said: “Separate – the girls on the left and the guys on the right.” After the groups had separated, he told them: “OK, the guys leave, the girls stay there.” They thought it was an end of session joke, and that the attacker was firing blanks. During this time, Lépine moved a little closer to the group of 9 girls who were standing together at the back of the classroom, with no possible exit. He said to them: “Do you know why you are there.” One of the girls answered “No”. He replied: “I am fighting

feminism.” The student who had spoken added: “We are not feminists, I have never fought against men.” He immediately started firing on the group, from left to right. After having fired perhaps thirty shots, he left the premises, leaving behind 9 victims, 6 of whom were among the victims who died.

Afterwards he roamed the school, shooting eight more women. He then killed himself, leaving behind a suicide note. That note begins: “Would you note that if I commit suicide today 89-12-06 it is not for economic reasons ... but for political reasons. Because I have decided to send the feminists, who have always ruined my life, to their Maker. Later, he continued: “the feminists have always enraged me. They want to keep the advantages of women (e.g. cheaper insurance, extended maternity leave preceded by a preventative leave, etc.) while seizing for themselves those of men.”

One Ecole Polytechnique student, Nathalie Provost, was interviewed while lying on a stretcher in the hospital after surviving the shooting. She was actually the student who told Lepine she was not a feminist. To the cameras, she said, “I ask every girl in Quebec and every where in the world who wants to be an Engineer to keep this idea in their mind.”

So how are we doing with Nathalie’s request? At the Ecole, female enrollment in the years after the massacre rose 7 percent. Across Canada, by 1999, ten years after the massacre, female enrollment in undergraduate engineering programs hit 20.6%.

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But that was the highest it would ever get in Canada. For the next ten years, it would slowly slide back down, to a lower percentage than in the mid 1990s. Since then, enrollment of women in undergrad engineering programs has remained stuck, hovering around 20%. This is especially remarkable because women make up way more than half of students in all undergraduate programs

The numbers get worse the deeper you look. The percentage of STEM masters degrees awarded to women is actually a little better than the percentage of undergraduate degrees, but the percentage of PhDs is worse. [[slide]]

And when women with science and engineering degrees do graduate and get into the job market, fewer of them find work in their fields than men, and when they do, they are paid less than their male peers. [[slide]] In 2011, 4.3 percent of men with an engineering degree were unemployed, compared to 7.1 percent of women. You can see that this disparity holds up across all STEM fields and is even worse in math and computer science.

This one shows skills mismatch – the percentage of STEM graduates who are doing a job that only requires a high school diploma.

And when they do get a job, they get paid worse. Women with an engineering degree are paid \$5000 less on average. Across all STEM jobs they’re paid \$9000 less.

We recently heard the argument that women just have less aptitude for this work. But that’s not actually true – women with really high scores in math in high school are actually less likely to go

into STEM university programs than men with high math scores. In fact, women with high math scores in high school were even less likely to go to university for STEM than men with LOW math scores.

So why is this happening? Why are women so underrepresented in engineering, and in other science and tech programs? Why is there so much attrition as they move forward in science, tech, engineering and math careers?

[[Target tweet slide]]

We know that some of the segregation, the funneling into girls activities and boys activities, starts incredibly early. A sociology researcher at the University of California looked at 7,300 toys ads in the Sears catalogue. She found that in 1975, only 2 percent of the toy ads had gender-based advertising. By 1995, half of the ads had gender-based messaging, the same ratio as the 1950s. The messages we get about our identities can be incredibly powerful. That same research that showed women with high math scores are less likely to go into STEM than men with low math scores also showed that men were more likely to rate their own math abilities more highly. Half of young men rated their math skills as very good or excellent compared to 37% of young women.

When women get into STEM studies, sexual harassment plays a role in making life difficult for them. [[slide]] In a study of 658 field researchers, 64% of all survey respondents, stated that they had personally experienced sexual harassment, defined as inappropriate or sexual remarks, comments about physical beauty, cognitive sex differences, or other such jokes. Over 20% of respondents reported that they had personally experienced sexual assault. That was the breakdown for all genders but the percentages skewed higher for women. And “trainees” were much more likely to be victims, with superiors much more likely to be perpetrators.

And I just want to add something: women suffer disproportionately from harassment, which can be alienating. But these studies tend to break gender down into a binary, and we know that people who are trans or whose genders aren't binary are often the most alienated of all. It's not something I've seen represented in research but that doesn't mean it's not out there.

When women try to break into the work force, unconscious bias plays a big role in diminishing them. In a 2012 study, science professors were asked to evaluate a CVs for a potential lab manager. The CVs were actually identical, but some had male names at the top and some had female names. The ones with male names were ranked as more competent and hireable, and were offered higher salaries – almost \$4,000 higher.

For a long time, Google's code of conduct had a famous motto: “don't be evil.”

They've dropped that motto, and you should too.

I doubt any here is going to murder women just for being an engineer. But you don't need to murder a woman to drive her out of science, technology, engineering and math. It's easy to not be evil. It's difficult to be a good ally.

We need allies who are going to tell their male friends to stuff it when they start talking about women's appearances behind their backs. We need allies who are going to take the initiative and implement hiring and recruitment policies that limit unconscious bias. We need allies who believe women when they say they've been harassed or assaulted, especially by someone in a position of power, who tend to receive the benefit of the doubt. We need allies who will be equal partners in the home, taking care of the household and childcare labour that disproportionately suck up women's time and making working more difficult for them.

Women, we just need you to be yourselves.

As the feminist writer Andrea Dworkin said: "It is incumbent upon each of us to be the woman that Marc Lépine wanted to kill. We must live with this honour, this courage. We must drive out fear. We must hold on. We must create. We must resist."