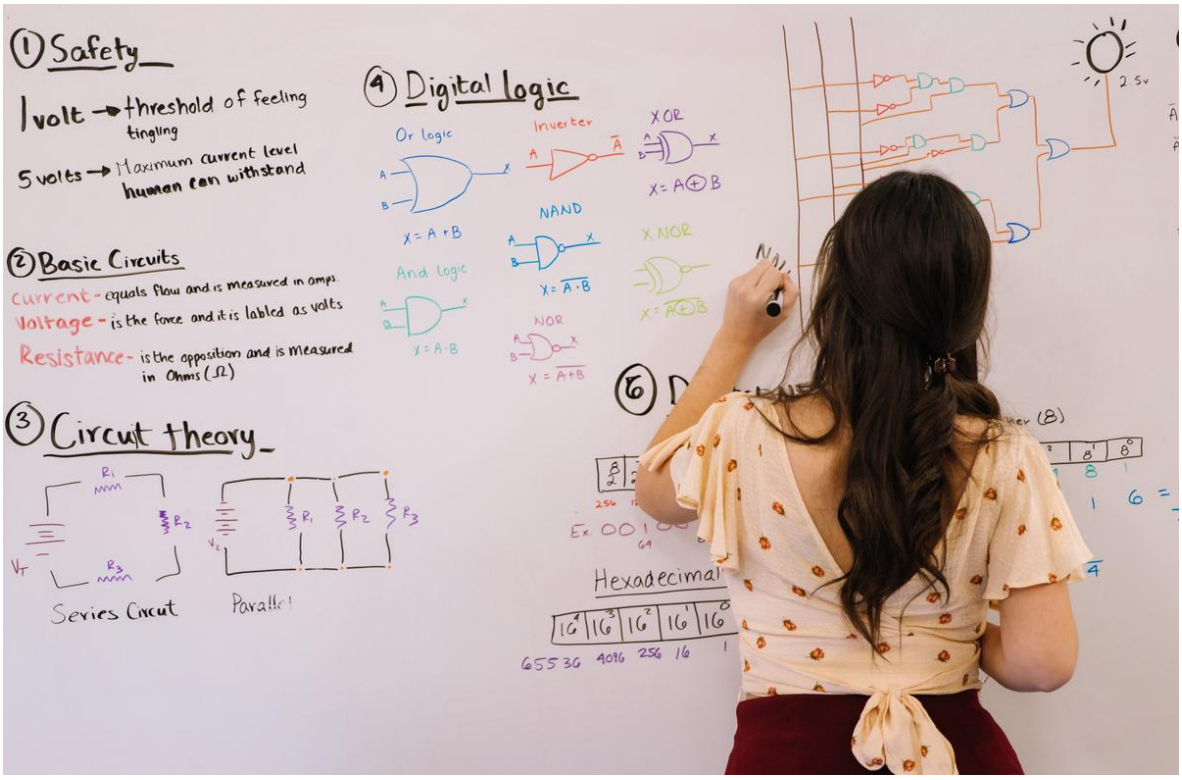
Education

Share of female graduates in science, technology, engineering and mathematics (STEM) at tertiary level (Canada)



Key points

- Women's representation in STEM-related studies largely remained stable or increased between initial enrolment and graduation during the period 2010—2016.
- The proportion of women differs considerably among STEM fields, with women making up the majority of graduates in biological sciences, but only 20% in engineering and 18% in computer and information sciences.
- Young women with a STEM undergraduate degree are less likely to find work in information and communications technology (ICT) than young men with the same degree.
- While women in STEM studies are less likely than men to find work in the field of ICT, they are equally likely to find work in science and engineering occupations.
- Gender gaps in earnings are larger in the field of computer and information science than in any other field among women and men aged 25—34. Non-immigrant women with a bachelor's degree in this field earn 76% of what non-immigrant men do.

Background

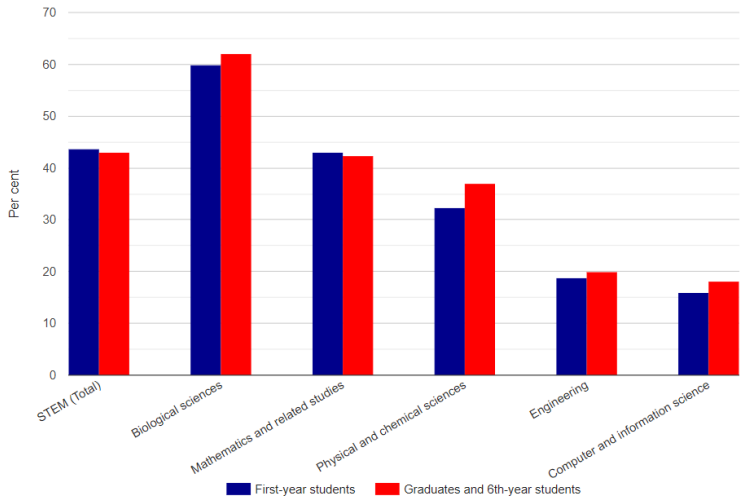
While women make up the majority of university students in Canada and in most developed countries, they comprise a minority in STEM fields, particularly in the fields of engineering and computer and information sciences.[1] This may limit women's economic equality since jobs in the field of science and technology, especially in engineering and computer science, are among the highest-paying and fastest-growing occupations.[2]

Women's representation in STEM fields of study and occupations can be affected by dynamics at several major points in their education and in their careers. The present paper explores changes in young women's representation in STEM education from initial enrolment in tertiary education through to graduation and transition into the workforce.

Women’s representation in STEM studies remained largely stable or increased between initial enrolment and graduation over the period 2010—2016

Within a cohort of undergraduate students who began their studies in 2010, women's representation in STEM studies remained largely stable or increased between initial enrolment and graduation (see figure I).[3] However, the share of women differed considerably between STEM fields, with women making up the majority of graduates in biological sciences, but only 20% in engineering and 18% in computer and information sciences: these data are of interest in terms of gender because the majority of STEM-related jobs are in engineering and computer and information sciences.[4]

Figure I: Proportion of women in selected undergraduate STEM fields of study at initial enrolment (first-year) and at graduation or sixth year of study 2010 cohort, persons who initially enrolled at age 19 or younger: 2010—2016



Source: Statistics Canada, Postsecondary Student Information System, longitudinal data, 2010—2011 to 2015—2016 (https://www.statcan.gc.ca/eng/survey/business/5017).

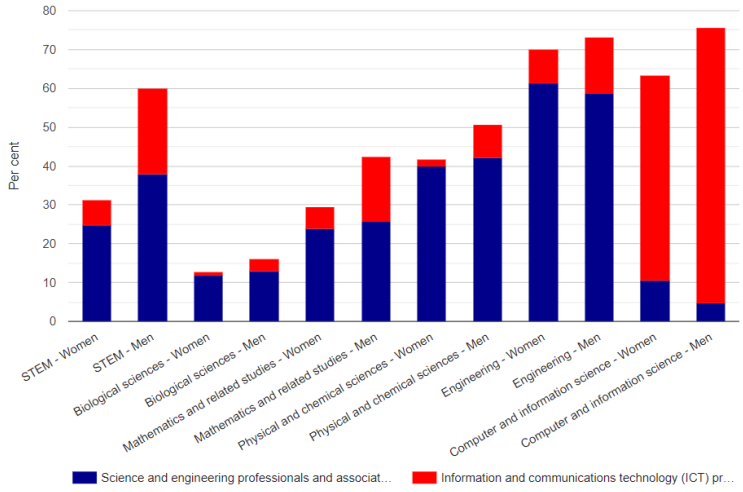
Young women with STEM undergraduate degrees are less likely to find work in ICT than young men with the same degree

Young women who graduate with degrees in STEM are less likely to find work in science and technology-based occupations than young men (see figure II). This disparity exists for two reasons. Firstly, the fields of study where women's representation is highest (see figure I), such as biological sciences, are the least likely to lead to a job in the field of science or technology, whereas the fields where their representation is lowest, engineering and computer and information sciences, are the most likely to lead to such a job.

While women in STEM studies are less likely to find work in ICT jobs than men, they are equally likely to find work in science and engineering occupations

Secondly, women in each STEM field of study are less likely to find work in ICT jobs than men (see figure II). The difference is particularly large for women who study mathematics or computer and information science, but it exists for woman graduates from each STEM field. In contrast, within each STEM field of study, women are about as likely as men to find work in science and engineering occupations.

Figure II: Percentage of women and men working in science and technology-based occupations, by selected fields of study, among employed bachelor's degree holders aged 25—34: 2016 (Percentage)



Source: Statistics Canada, 2016 Census (https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/index-eng.cfm).

Note: The population comprises persons aged 25—34 with a bachelor's degree completed in Canada as their highest level of education (excluding law and pharmacy degrees), who had an occupation (excluding non-permanent residents).

Gender gaps in earnings are largest in the field of computer and information science than any other field of study among women and men aged 25—34

Computer and information science also has one of the largest gender gaps in earnings of any field among women and men aged 25—34. Non-immigrant women with a bachelor's degree in this field make 76% of what non-immigrant men make, and immigrant women make 66% of what immigrant men make. For comparison, in fields like health care, biological sciences, law and engineering, non-immigrant women make at least 86% of what non-immigrant men do, and immigrant women make at least 79% of what immigrant men do. Women's lower wages and lower likelihood of finding a job relevant to their fields of study may give them less incentive than men to choose to study computer and information science when beginning their tertiary education.

There are two key barriers to women's equal representation in STEM in Canada: (a) lower enrolment rates in engineering and computer and information science degrees; and (b) women with STEM degrees having a lower rate of job matches and lower wages than men, specifically connected to gender disparities in the ICT sector.

About the data

This narrative examines the share of women studying science, engineering and mathematics (STEM) among first-year enrollees in undergraduate programmes in 2010 and among members of the same group who had graduated from those programmes or were still enrolled in their studies six years later.

Coverage

Students in Canada who began a full-time undergraduate degree in STEM in 2010 at age 19 or younger.

Availability

Longitudinal data from the Statistics Canada Postsecondary Student Information System[5] are available from the period 2010—2011 onwards.

From 2010 onwards, Canada has a complete administrative database of enrolments and graduations from public colleges and universities, allowing the tracking of students' pathways though tertiary education. Administrative data on enrolments and graduations, which are available from 1992 onwards, cannot be used to track student pathways at the national level prior to 2010.

Footnotes

1. Organization for Economic Cooperation and Development (OECD),"How have women's participation and fields of study choice in higher education evolved over time?", Education Indicators in Focus. No. 74, OECD Publishing, Paris, March 2020 .

2. Statistics Canada, 2016 Census; and Statistics Canada, Labour Force Survey 1990—2018 .

3. The group of graduates also contains those who had not yet graduated from their STEM programmes as of their sixth year of studies. This is not likely to have a major impact on the data as drop-outs from postsecondary are uncommon in the later years of a degree. On average, women completed their STEM programmes in fewer years than men and were less likely than men to take six years or more to complete them.

4. Statistics Canada, 2016 Census : nearly three-quarters (72%) of people in science and technology occupations work in engineering and engineering technology or computer and information systems (NOC minor groups 213, 214, 217, 223, 224 and 228) (table 98-400-X2016271).

5. Statistics Canada, Postsecondary Student Information System .