

Perspectives: Canadian Women in Computer Science

Rhian Davies, Mark Hancock, and Anne Condon
 The Department of Computer Science
 University of British Columbia
 2366 Main Mall
 Vancouver, B.C., Canada

This article provides a brief overview of statistics on the participation of women in computing in Canada, the factors that contribute to the low participation of women, and current programs that aim to increase the participation of women in computing fields.

Statistics. In Canada, females participate in Computer Science and Information Technology in lower numbers than their male counterparts both at school and in the work force. Girls, particularly those from lower socio-economic groups, have less home access to computers and the Internet than do boys. Female students are enrolled in fewer Computer Science courses and are awarded fewer degrees in Computer Science at all levels, from high school Information Technology courses to PhD degrees (see tables 1-4). Fewer women than men teach Computer Science, with women holding 7% of all Full Professorships in Computer Science. In industry, women represent about 25% of computer professionals across Canada.

Grade	Female Enrollment		
	1994/1995	1995/1996	1996/1997
8	42 %	42 %	42 %
10	13 %	16 %	17 %
11	35 %	35 %	35 %
12	26 %	23 %	21 %

Table 1. Female enrollment in British Columbia high school's Information Technology classes.

Data obtained from Gentech: <http://www.educ.ubc.ca/faculty/bryson/gentech/data3yrs.html>

	Female Enrollment
College & University Courses	25 %
Full-time Career Programs (1994/95-1998/99)	Low: 23 % (1996/97) High: 26 % (1994/95)

Table 2. Female enrollment in courses at the college and university level.

Data obtained from Statistics Canada. Education in Canada 2000.

	Female	Male	Unknown
Bachelor's Degree Graduates (1994-1998) *	20 %	80 %	
Master's Degree Graduates (2002) **	24 %	64 %	12 %
PhD Graduates (2002) **	12 %	80 %	8 %

Table 3. Female graduates of university degrees in Canada.

* Data obtained from Statistics Canada

** Data obtained from Computing Research Association's Taulbee Survey

	Female Percentage
Full Professorships	7.0 %
Associate Professorships	14.0 %
Assistant Professorships	16.5 %
Non-tenure Teaching Positions	31.3 %

Table 4. Percentage of women in academic positions at Canadian PhD-granting universities.
Data obtained from Computing Research Association's Taulbee Survey, 2002

In the workforce in 1996, women across Canada make up 16% of the high-tech scientific workforce, (Matsui, 2000). 26% of computer professionals, defined as computer programmers, systems analysts, and computer engineers, are women (Dryburgh, 2002).

Cultural Factors. Cultural factors that lead to the low participation of Canadian girls and women in computing are likely similar to those in the U.S., and include the nerdy image of the field, the fact that computer games for children are targeted mostly at boys, the perception of computing careers as boring, and the lack of role models for girls (Margolis and Fisher, 2002). It has been noted, however, that Canadian girls do have an interest in playing video and computer games, especially when given the opportunity to socially interact with others (Inkpen et al., 1994).

Willms and Corbett reported that Canadian girls have somewhat less access to computers than boys, and that boys use computer tools in more diverse ways. While access to home computers and the Internet is almost universal among families with high socio-economic status (SES), and differs by about 10% between boys and girls in families of lower SES, the SES of a child's family is not the only factor influencing a young girl's chance of having access to a computer or the Internet. Overall, the odds that a boy has access to a computer and the Internet in Canada are about 15% higher than the odds that a girl has access (Willms and Corbett, 2000). Moreover, a study of over 7,000 high school students in Vancouver, B.C. indicates that girls' level of interest in Computer Science is low, compared with that of boys (Chan et al. 2000).

Current Action and Existing Programs. Many efforts are currently being made to increase the participation of women in the field of Computer Science. Programs exist across Canada, both to encourage women to pursue careers in technology and also to support the development of their careers.

One example, the Wired Women Society, has over 2000 members in five different provinces; these members provide educational programs to women of all ages, including courses in networking and web authoring. A mentorship program, another key initiative, provides guidance to younger members by connecting them with more senior female role models.

Universities across Canada have formed committees that focus on increasing female enrollment in Computer Science programs at both the undergraduate and graduate levels and on offering support to women currently enrolled in these programs. At the University of British Columbia, Dr. Maria Klawe initiated the Supporting Women in Information Technology (SWIFT) project; SWIFT initiatives have reached students from middle school to college and beyond, and include novel approaches to teaching programming to high school students (MacGregor et al. 2002). The "Alternative Routes to Computing" program, successful in maintaining a gender balance, offers an alternative route to a high-tech career for people who already have degrees in other fields

(Klawe et al. 2000). Industry initiatives include IBM Canada's workshops and summer camps for girls, in which IBM technical women teach girls about computer technology.

At the University of Ottawa, the School of Psychology is exploring the benefits of the availability of all-female high school Computer Science courses (Crombie et al. 2000); in a case study the number of students participating in Computer Science classes rose from 10% to 40% upon the introduction of all-female classes. The results suggest that these all-female classes have a positive influence on confidence and future academic intentions.

Programs that help support women in the science and technology include the Society of Canadian Women in Science and Technology (SCWIST) and the Canadian Coalition of Women in Engineering Science and Technology (CCWEST). The Natural Sciences and Engineering Research Council (NSERC) also offers financial support to women through the Chairs for Women in Science and Engineering, with the objective of raising the level of participation in science and engineering and to providing accomplished, successful and recognized role models.

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