



Why are Women Avoiding Computer Science in North American Universities?

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The issue

Women in Computer Science (CS)

2015 → 15.3 %

1990s → 34 – 40%



Figure 1. Grace Hopper (<http://www.naturphilosophie.co.uk/amazing-grace-hopper/>)

The issue

- Margolis and Fisher – *Unlocking the clubhouse: Women in computing* (2002)
- Goal: examine the possible factors for the gap in male and female enrolment in CS within North America
- BC announcement



Why is CS education important?

- Fundamental 21st century skill
- CS skills required for many jobs
- Empowers students economically and professionally

Why is CS education important?

20 highest-paying jobs for women, 2012

Computer science skills lead to four of the 20 highest-paying jobs for women, as ranked by pay and a low gender gap in pay and hiring.

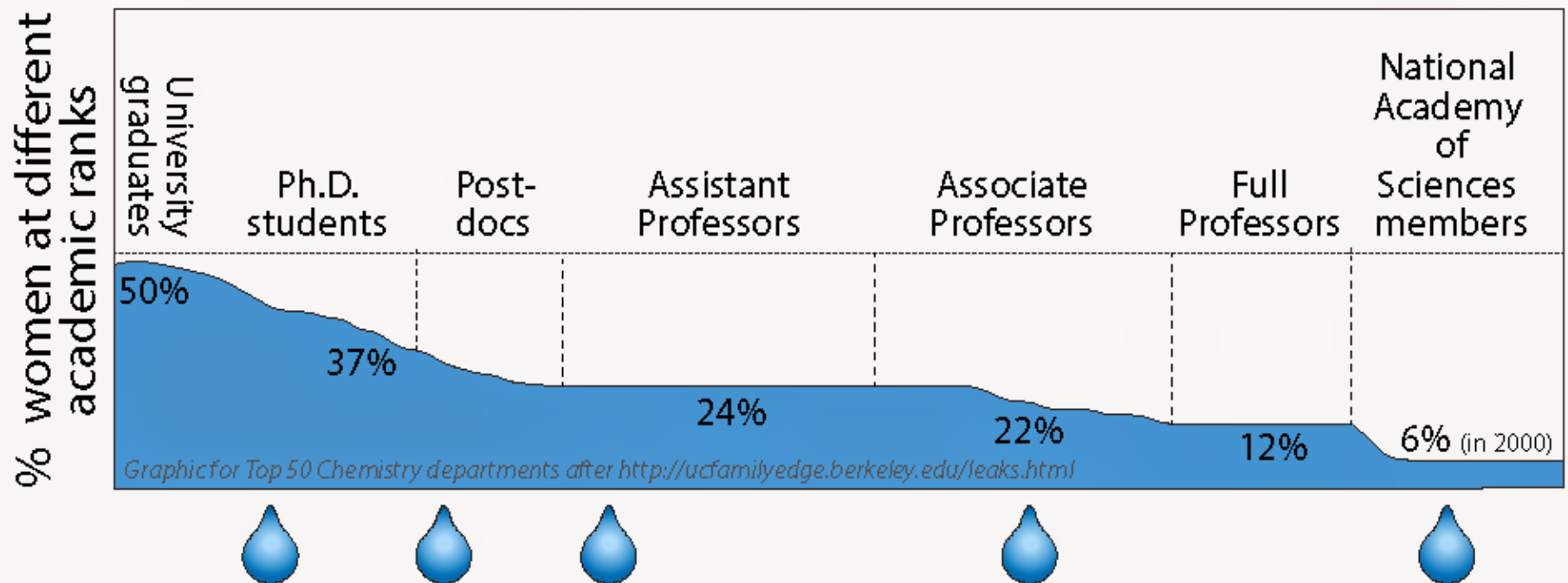
Rank	Occupation	Women's median wage	Women's pay as percent of men's	Percentage of workers who are female	Total female workers in U.S.
1	Pharmacists	\$97,292	99.6%	52%	116,000
2	Chief executives	\$89,960	76%	26.4%	265,000
3	Lawyers	\$85,072	79.6%	33%	228,000
4	Nurse practitioners	\$79,560	NA	84.4%	65,000
5	Computer and information systems managers	\$79,404	87.8%	25.5%	145,000
6	Physicians and surgeons	\$73,736	67.6%	34.5%	226,000
7	Physician assistants	\$70,928	NA	69.3%	61,000
8	Software developers, applications, systems software	\$70,824	81.4%	19.6%	197,000
9	Management analysts	\$68,900	86.3%	42.2%	202,000
10	Computer systems analysts	\$65,208	84.9%	33%	145,000
11	Human resources managers	\$62,816	83.5%	74.1%	160,000
12	Occupational therapists	\$62,400	NA	96.5%	82,000
13	Medical and health services managers	\$61,880	77.1%	71.3%	358,000
14	Physical therapists	\$61,880	87.4%	61.1%	88,000
15	Physical scientists, all other	\$60,892	76.9%	34.5%	50,000
16	Operations research analyst	\$60,788	75.4%	55.1%	70,000
17	Psychologists	\$60,060	NA	77.4%	72,000
18	Computer programmers	\$59,696	84.2%	22.8%	100,000
19	Speech-language pathologists	\$58,292	NA	98%	86,000
20	Marketing and sales managers	\$57,720	68%	44%	402,000

Source: Anita Borg Institute, based on Current Population Survey, Bureau of Labor Statistics

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The CS pipeline

Leaks in the academic pipeline for women in STEM fields



CS challenges in high schools

- Most high schools do not have CS courses
- Inconsistent certification of CS teachers
- General lack of standards in CS education
- Efforts to improve standards are divided

Factors influencing women's decision to enrol in CS

- 1) Stereotypes and role models of computer scientists
- 2) Computing confidence and experience
- 3) Women's values and interest in CS
- 4) CS learning environments

Initiatives for attracting women to CS

- University CS outreach (UBC GIRLsmarts4tech)
- High school clubs
- Changes to introductory CS courses
- Mentoring university students (UBC Tri-mentoring program)
- Conferences, scholarships and awards

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Women and CS in other countries

- Similarities
 - **Four factors**: stereotypes, computing experience, etc.
- Differences
 - **Malaysia**: CS not masculine, lack of CS stereotypes, female role models
 - **India**: high confidence in mathematical abilities leads to high recruitment into CS
 - **Armenia**: CS considered suitable for women

Proposed solutions

- Dispel stereotypes regarding CS
- Provide CS role models for female students
- Make clear the societal importance of CS
- Educate parents, peers and teachers on CS for women
- Create mandatory CS classes in high school and promote CS courses in university first-year programs
- Increase outreach from universities and colleges to high schools
- Produce more educational campaigns that promote CS education for women
- Improve young women's access to CS conferences, funding, and scholarships
- Improve the certification process for CS teachers and educate them on issues of gender inclusion
- Change CS courses in high schools and university to better reflect women's values
- Reach policy makers, government and industry and get them to understand and support the issue at stake

Proposed solutions

- Focus on four factors:
 - Dispel CS stereotypes and provide women with role models
 - Provide more computing opportunities to young women
 - Ensure CS values reflect women's interests
 - Create women-friendly CS environments

Systemic change

- The government needs to be involved
 - USA: *Computer Science for All* initiative
 - Canada: BC to be adding computer coding to the K-12 curriculum over the next three years

Limitations

- Socioeconomic factors

Resources

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