Strategies for Recruiting and Retaining Women in Science and Engineering

Anne Condon, CS Dept, UBC
first, some motivation

• many opportunities for girls in science and engineering
first, some motivation

• girls enjoy science and engineering
first, some motivation

• careers as an educator and researcher are fantastic!
overview

• data on representation of women
• why are women under-represented?
• why is this a problem?
• what can we do about it?
on representation of women


Women's University Enrolment All Levels 2001/02

- Total All Fields: 57.4%
- Health Professions & Occupations: 70.1%
- Agriculture & Biological Sciences: 63.3%
- Mathematics & Physical Sciences: 30.4%
- Engineering & Applied Sciences: 23.1%

[www.ccwestt.org; http://www.statcan.ca/Daily/English/030331/d030331b.htm]
on representation of women

- statistics from UBC:
  - 2004: 52% of students entering Faculty of Science are women
  - 2003: 18% of Science faculty are women (36% at assistant professor level)
  - 2003: 13% of Engineering Faculty are women (11% at assistant professor level)
on representation of women

UBC historical data - women:men in Science

• **1973**: full prof 2:96, associ prof 5:80, assistant prof 5:80, inst/lect 9:17
• **1993**: full prof 4:183, associ prof 2:50, assistant prof 8:42, inst/lect 12:8
“Women with eight or nine years of postdoctoral experience who are employed full time in tenure-track positions in academia are about 5.9 percentage points less likely than men to be tenured...

women with 14 or 15 years of postdoctoral experience who are employed full-time in academia are almost 14 percentage points less likely than men to be employed at the rank of full professor

- Jerome Bentley, Donald Wise “Gender differences in the careers of academic scientists and engineers” (NSF)
on representation of women

statistics from U. Saskatchewan

• 7 out of 28 CRC’s in Science are women!
• Engineering has 4 female faculty out of 76 (none at associate or full professor rank)
• Engineering hired 34 sessional lecturers last year, incl. 7 women
• Science numbers not available
why women are under-represented

three explanations I find compelling:
• gender schemas
• institutional structures and practices
• expected roles of women outside work
gender schemas

• "hypotheses about what it means to be male or female... affect our judgement of people's competence, ability, and worth" - Virginia Valian

• contrast with hypotheses about what it means to be a scientist/engineer
effects of gender schemas

unintended bias:

- a study of grant evaluation scores of the Swedish Medical Research Council revealed gender bias in “scientific competence” scores
- “total impact factor” found to be best predictor of competence score (of six considered; yet biased
- regression analysis showed that gender and affiliation with committee member were also significant predictors

effects of gender schemas

unintended bias:

• “the system rewards and encourages people [that are] assertive and single-minded ... my personal view is that what we want in a scientist is not assertiveness, but intellectual curiosity and thoughtfulness, and not single-mindedness, but dedication and perseverance.”
- Howard Georgi, APS News, January 2000
effects of gender schemas

low sense of *entitlement* relative to men can lead to

• acceptance of lower pay for same work
• willingness to accept inequitable teaching assignments
gender schemas

• we need to acknowledge effect of gender schemas
• our evaluations and reactions occur unintentionally and outside awareness
• although effect of any one decision is minor, accumulation of small biases can be significant
why women are under-represented

three explanations I find compelling:

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institutional structures/practices

- intense pre-tenure years coincide with period when many faculty have young children
- poor support for dual-career couples, exacerbated by amount of relocation needed during postdoc years
- lack of transparency in university practices
- lack of diversity among faculty
"... it was just assumed that these women (undergraduate students) would move up through the system, but it's not happening exactly like that ... We're seeing women at the associate and assistant professor level opting not to go into academic positions ... We're losing the pool and the women are intentionally opting out.” - Margaret-Ann Armour
expected roles of women outside work

• women expected to take on more child-care, family responsibilities
• women more likely to express need for work/life balance
• "The university demands 60-80 hours per week for success and that is just too much. I want to be a whole person" - female associate professor

• "The academic atmosphere has become unbearable due to continuing increase in demands as infrastructure crumbles. Students are so needy for professors who have time and we are all running around like chickens with our heads cut off. Still love the job.” - assistant professor

under-representation of women is a problem...

- for the women who do not enjoy careers commensurate with their qualifications
- for science and engineering disciplines which do not benefit from insights of a broad cross-section of the population
- for students, who lack models of their future
what can we do about the problem?

• focused, persistent efforts CAN work
• leadership from the top essential
• push from the bottom essential
"...real progress has been made at MIT... the number of women in top administrative, decision-making posts is now more than 10, up from 1... at the time of the report. There is [...] monitoring [...] of compensation and other resources to ensure that they are distributed equally [...] a number of new family care policies have been instituted" - L. Bailyn, Gender, Work and Organization, 10:2, 2003.
progress at UBC

• **1973**: Report on the Status of Women at UBC, sponsored by Women’s Action Group, Shelagh Day
  – recommends women’s office, childcare, housing, plan for equal education and employment for women

• **1993**: Second Annual Report on the Status of Women at UBC, Florence Ledwitz-Rigby
  – lists recent “steps forward”: child care, partner relocation/employment assistance, maternity/parental leaves, extension of pre-tenure period
  – recommends education on chilly climate, better mentoring, better appreciation of interdisciplinary research, inclusion of women in leadership roles

• **2005**: Study of climate in Science underway, inspired by work at MIT and elsewhere
and their passions outside of the lab.

Andrew Damascelli, Physics and Astronomy. Research: Electronic structure of complex systems and nanostructured materials. “Diving into the study of new materials and processes that challenge our understanding of the fundamental laws of nature.”

Rachel Kuske, Mathematics. Research: Stochastic and non-linear dynamics. “Seemingly unrelated processes, observed in physics, biology, or finance, have striking similarities when their complexity is studied with a mathematical model. Keeping up on these diverse projects complements my love of travel, my support of women in mathematics, and my desire to inspire students to explore new areas of science.”

Riley Smith, Earth and Ocean Sciences. Research: Reflection seismology. “I’ve been hooked on understanding the complexity of the Earth’s interior. I am also addicted to transferring the latest imaging and modelling techniques to seismology. Even with a brief introduction to the latest technology and modelling techniques, I am able to apply them to the field.”

To escape my complicated life with Rachel K., I hope to do some exploring on my bike once I get used to the mountains.”
progress at UBC, UVic

• “Since July 2003 we have hired four women and eight men... we take a lot of interest and ... follow up post-interview” - Vijay Bhargava, Head, ECE, UBC

• “... we have ten female faulty out of a total complement of 31.5 ... by the early nineties we had three which gave us a critical mass. We have certainly always encouraged a collegial atmosphere of real respect in the department... In the mid eighties we also tried very hard to talk to all of the qualified women who were looking for academic positions” - Jon Muzio, Head, CS, UVic
what can we do about the problem?

- focused, persistent efforts CAN work
- leadership from the top essential
- push from the bottom essential
"We at the Pacific Institute for the Mathematical Sciences (PIMS) are determined to increase the presence of women in mathematics, by breaking down social stereotypes of the kind we have just heard, and by encouraging female participation in our activities. We thank our female colleagues in the mathematics departments of PIMS universities for the substantial contributions they are making to mathematics, and we hope there will be more of them in the future.” - Ivar Ekeland, Director, PIMS
leadership from the top

• engage in discussion with interested faculty; read the literature
• enable women to define their concerns
• periodically gather institutional data
• understand the issues specific to your institution or department
• send a clear message of commitment, backed up by resources
• set achievable goals; take ownership of them
• don't be afraid to make mistakes
reconsider recruiting practices

- pinpoint the problems
- have clear policies on partner hires
- use broad search criteria
- start early: encourage your best ugrads to go to grad school and stay in touch with them
- train recruiting committee chairs
- tap into the NSERC UFA program
support work/life balance

• clear parental/maternity leave policies
• flexible clock
• other creative solutions
improve the work environment

• ensure equitable service, teaching loads
• ensure transparency in department, university policies and practices
• provide mentoring of faculty, even post-tenure (when awards, salary equity can be an issue)
be good citizens

• share information (who gets invited to lunch with the potential industry sponsor? ...)
• leverage support from other sources (CRA-W, ...)
• be a role model (acknowledge child-care commitments, find balance in your life...)
• mentor as well as advise your graduate students
• think of women for distinguished talks, awards
in closing

• with perseverance and thoughtful action, we can increase the representation of women in our faculties, and change our institutions for the better
• collaboration among social scientists, scientists, administrators is key to this effort
• good luck!
resources

These sites describe strategies for hiring dual-career couples, assessing and improving the institutional environment, assisting tenure-track faculty, and so on

• Michigan’s Advance project
  www.umich.edu/~advproj/handbook.pdf

• Committee on the Advancement of Women Chemists
  coach.uoregon.edu/coachfiles/research.html

• Wisconsin’s Women in Science and Engineering Leadership Institute
  wiseli.engr.wisc.edu/

• Computing Research Association’s Committee on Women
  www.cra.org/craw

• Washington’s Advance project
  www.engr.washington.edu/advance/
reports/data

- Gender differences in the careers of academic scientists and engineers
• Virginia Valian. Beyond Gender Schemas: Improving the Advancement of Women in Academia.
thank you!

“Never doubt that a small group of thoughtful committed citizens can change the world, indeed it’s the only thing that ever has” - Margaret Mead