Gender Diversity in Computer Science in North America

Percentage of CS degrees achieved by female students in US and Canada in 2013/14:

- PhD 17.6%
- MS 22.0%
- BS 14.2%

Bachelor’s Degrees Awarded by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>CS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>9,116</td>
<td>85.8%</td>
</tr>
<tr>
<td>Female</td>
<td>1,511</td>
<td>14.2%</td>
</tr>
</tbody>
</table>

Why Aren’t Women Interested in Computer Science?

By KHADEEJA SAFDAR

Growth in the share of women entering science, technology, engineering and math (STEM) fields has slowed down, according to a report recently released by the Census Bureau.

By RANDALL STROSS

Improving Diversity in Computer Science at CSU
Ethnic Diversity in Computer Science in North America

Percentage of BS/CS degrees sorted by ethnicity in US and Canada in 2013/14 (% of population):

- White 53.0% (62%)
- Asian 18.2% (6%)
- Hispanic 6.5% (17%)
- Black 4.5% (13%)
- Nat. Amer. 0.4% (1%)
- Non-resident 8.6%

Taulbee Survey

Improving Diversity in Computer Science at CSU
Diversity in Computer Science at Colorado State University

- CSU, 2014/15, 102 confirmed CS and ACT majors:
  - 11 female (10.7%), 5 black (4.9%), 11 hispanic (10.7%)
  - already exited – 4 females, 1 black, 2 hispanic
- CSU, 2015/16, 121 confirmed CS and ACT majors:
  - 12 female (9.9%), 2 black (1.6%), 11 hispanic (9.0%)

In 1984, 37.1% of Computer Science degrees were awarded to women.
Women Who Choose Computer Science – What Really Matters

The Critical Role of Encouragement and Exposure

1) **Social Encouragement** 28.1%, most important factor
   - Family Support 17%, Peer Encouragement 11%
2) **Self Perception** (of competency) – 17.1%
3) **Academic Exposure**, e.g. AP/CS – 22.4%
   “Anything is better than nothing”
4) **Career Perception** – 27.5%, second most important
   - Uncontrollable and Non-Influential Factors:
     geography, income, ethnicity, early exposure, …
Success with Diversity at Other Institutions

- University of Colorado – 2X increase female CS majors

Number of women in CU–Boulder computer science program doubles

- University of Washington – 30% of BS/CS to females

UW recognized for recruiting women to computer science

- Carnegie Mellon – 7% to 42% female CS freshman

- Stanford, Harvey Mudd, UC Berkeley, etc., etc.
1) Recruiting and Retention Scholarships in Computer Science

- $1000 scholarships offered to highest ranking incoming female/minority students (recruiting).
- $5000 scholarships offered to highest ranking undergraduate female/minority students (retention).
2) High School Outreach and Summer Programming Camps

Girls Who Code
• Weekly programming club for female students in 6th to 12th grades. (2015/2016)

Teacher Training
• Intensive workshop on Java for high school teachers. (2017)

Summer Camps
• One week camps on-campus to make programming fun for female middle/high school students (2016)
3) Community Building Example - ACM-W Organization

- Current accomplishments - many for such a new organization:
  - Weekly meetings
  - Industry Day Panel and Networking Event
  - Android Development Seminar

- Future Plans - obtain funding and resources to support activities:
  - K-12 schools outreach
  - Grace Hopper and NCWIT summit
  - Guest speakers
4) Curriculum Changes for Broader Participation in Computer Science

- **Pedagogics**: media computation, peer instruction, inverted classroom, and automated grading
- **Accessibility**: separate versions of initial course for student with and without programming experience
- **Future Plans**: redesign of non-major computing course to widen appeal and increase relevance.
Media Computation

Improving Diversity in Computer Science at CSU
Automated Grading

Improving Diversity in Computer Science at CSU
5) Organizational and Computer Science Education (CSE) Related

- Diversity committee active in department
- Attendance at NCWIT annual conference
- 21.7% (5 out of 22) female faculty
- 33.3% (2 out of 6) female instructors
- Extensive use of minority and female TAs
- Full-time faculty with emphasis on CSE
6) NSF Grant Proposal for Undergraduate Education

- National Science Foundation (NSF)
- Improving Undergraduate STEM Education (IUSE)
- Plan to seek $100-200K funding in 2015/2016 for K-12 outreach, summer camps, ACM-W support, CSE research, conference attendance, etc.
Partnering Opportunities to Improve Diversity in Computer Science

- Work with teaching faculty to define and implement outreach and summer camps.
- Provide (private and corporate) funding for diversity scholarships:
  - Frances E. Allen Fellowship in Computer Science
    Underrepresented (typically women) for retention
  - Inclusion and Excellence Scholarship
    Underrepresented (typically minorities/women) for recruitment
  - Steven Boyd Scholarship
    Support for underrepresented (typically minorities) for retention
- Contact Lesa Thomas lesa.thomas@colostate.edu or Simone Clasen simone.clasen@colostate.edu