Getting more females into computing: the Harvey Mudd College story

Maria Klawe
Females in CS: Why so few?

• Why so few enter CS
  – Females think CS is less interesting than other areas
  – Females think they will not do as well in CS as in other areas
  – Females (and males) encouraged to major in what interests them and what they are good at.
Females in CS: Why so few?

• Why some leave CS
  – Lack of confidence
  – Lack of sense of belonging
  – The impostor syndrome
What works

• Increase interest
  – Emphasize creativity and problem-solving
• Increase confidence in ability
  – Encourage while setting high expectations
• Increase sense of belonging
  – Role models, Hopper conferences
• Increase persistence
  – Host impostor panel
Maria Klawe

Presidential Impostor
Harvey Mudd College
An Impostor’s Career

• Corporate Director, Broadcom, 2011 - present
• Corporate Director, Microsoft, 2009 - present
• President, Harvey Mudd College, 2006 - present
• Dean of Engineering, Princeton 2003-06
• Dean of Science, U. British Columbia 1998-2002
• VP Student & Acad. Services, UBC 1995-1998
• Head, Dept. Computer Science, UBC 1988-1995
• Research manager, IBM Almaden 1984-1988
• Researcher, IBM Almaden 1980-1984
• Asst. Professor, CS, U. Toronto 1979-1980
• Grad studies, CS, U Toronto 1978-1979
• Asst. Professor, Math, Oakland U. 1977-1978
• Ph.D. Math, U. Alberta, 1977
I feel like an impostor when I...

• Start doing something new that is
  – Something successful people do
  – Something women don’t often do
I have felt like an impostor...

• 1975: eating in a restaurant, attending a math conference
• 1980: taking a taxi, staying in a nice hotel, renting a car, giving a talk at Stanford
• 1990: attending SIGGRAPH, giving a keynote address, doing a press conference
• 2000: meeting CEOs, Nobel Laureates
• 2008: meeting billionaires
• 2009: joining the Microsoft board
Tips for success with impostoritis

• Practice, practice, practice
• Accept self-doubt as part of who I am
• Surround with support
• Look back as well as ahead
The Harvey Mudd College Story

• Undergrad only
• 750 – 800 students
• 85 faculty, seven departments
• Science and engineering
• Broad and deep core for first three semesters
• Every student takes a CS course in their first semester
Getting from 10% to 40%

• Female students at HMC over all:
  – 22% in 1997
  – 32% in 2006
  – 45% in 2013

• Female faculty at HMC over all:
  – About 20% in 1997
  – 33% in 2006
  – 40% in 2010
What the CS department did...

- Changed the intro course
- Eliminated student macho behaviour
- Took first year females to Hopper
- Provided summer research experiences between first and second year
Changing the intro course

- Old course: learning to program in Java
- New course: team-based computational approaches to problem-solving using Python
- Grouping by prior experience
  - CS 5 gold, CS 5 black, CS 42
  - Elimination of macho behavior for CS 5 and CS 60
- Outcomes: everyone loves it, more majors, more non-majors in higher level CS classes
Taking first year females to Hopper

• Christine Alvarado

• Invitation to all incoming females in summer
  – Allows scheduling of labs to minimize lost time
  – Experience valuable independent of planned major

• Fund-raising (industry, dept., deans, benefactors)

• Outcomes: inspiration, critical mass of interest, awareness of job opportunities, role models
Summer research experience

• After first year ideal because not many other options

• Outcomes:
  – Highly motivating
  – Builds confidence and sense of belonging
  – Connection with faculty member and research group
What carries over to the other institutions

• Make intro courses the most fun ever
• Eliminate macho behavior
• Build confidence
  – Team projects
  – Assignments in labs
  – Encourage
• Take students to Hopper
  – Hold a local Impostor panel
• Offer females summer research experiences
• Recruit biology, chemistry, psychology majors into CS
  – Double majors, joint courses
Sharing our approach with the world

• Disseminating CS 5 materials
  – https://www.cs.hmc.edu/twiki/bin/view/ModularCS1/WebHome

• MY (Middle Years) CS

• A MOOC for high school and middle school
  – Teachers
  – Students
Questions and Comments