



Diversity in Undergraduate Education in Computer Science



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Outline

- The diversity and inclusion journey at Harvey Mudd
- Making the CS major accessible and engaging
- CS curriculum for non-CS majors
- Scaling the CS faculty?
- Discussion



Harvey Mudd College?

- Tiny science and engineering liberal arts college (800 students, 90 faculty)
- One of 5 undergraduate Claremont Colleges
- Competes with MIT, Caltech and Stanford for students
- Student values: honor code, helping others, challenge, hard work, humility
- Faculty values: educating our students, excellence and innovation in teaching and curriculum, research with undergraduates, hard work
- Most expensive college in USA, ranked #1 for ROI for last 4 years (80% of students receive some financial aid, high salaries after graduation)

HMC, founded in 1955 as coed,
mostly white and male for 30 years



Increase in female faculty and students 1996 to 2016

	1996	2006	2016
faculty	~20%	~30%	~40%
students	~20%	~30%	~50%

Increase in student racial diversity, first year class 2012 to 2015

- African-American: ~1% to ~6%
- Hispanic: ~5% to ~20%
- Native Am./Pacific Is.: ~1% to ~3%
- International: ~10% to ~14%
- Asian-American: stable, 20 to 25%
- Caucasian: steadily decreasing, now about 40%

Increase in faculty racial diversity?

- Much slower
- Fairly steady progress, when attention slips progress disappears
- Critically important to educate search committees

Making the CS major accessible and engaging

- Hypothesis: if ...

- you make the environment supportive and engaging for all,
- build confidence and community among underrepresented groups
- And demystify the path to success

a highly diverse population will come, thrive and succeed

Recommendations for intro course(s)

- Separate sections by prior experience
- Set expectation that hard work and asking for help lead to success
- Encourage collaborations, pair homework assignments
- Provide lots of support
- Ensure students have same ability to succeed at next course independent of prior experience
- Frame as creative problem solving with real life examples
- Eliminate macho behaviour
- Encourage students to take next course

Recommendations for next steps

- Ditto for next course(s)
- Provide early internships (industry) and research experiences
- Take students to conference with diverse attendees (e.g. Hopper, Tapia in US)
- Build community (clubs) and access to role models (faculty, speakers, mentors from industry)

CS Education for non-CS majors

- Computing influencing almost every discipline and profession
- Most CS curriculum designed for CS majors, too vertical for non-CS majors
- CMC-HMC initiative

Scaling the CS faculty

- Supply < demand, getting worse
 - Growth in students wanting CS education
 - Many CS Ph.D.s and faculty moving to industry
- Difficult to significantly increase Ph.D. output
 - Most undergrads choosing industry over grad programs
 - Lack of CS faculty
- Solutions?
 - The Stanford pilot, 1 yr M.Sc. program in CS education after Ph.D. in other area
 - Postdocs in CS for Ph.D.s using computing in their discipline

Discussion

