HOW UNIVERSITIES ARE CREATING NEW PATHWAYS TO DIVERSIFY TECH

Valerie Barr, Carla Brodley, Colleen Lewis
Moderator: Andrea Danyluk
WELCOME
Motivation

The tech industry is booming and pervasive
- Significant impact on individuals and society

It should represent those it affects
- Many groups remain underrepresented
- An issue of social and economic equity

These three panelists are changing the way CS is taught and providing new pathways to CS
INTRODUCTIONS AND MODELS FOR CHANGE
Valerie Barr in One Slide

Intro #1: The Technical Me

- MHC BA in Applied Math, NYU MS in CS, Rutgers PhD
- Hofstra University, 1995 - 2004
- Union College, 2004 - 2017
- Mount Holyoke College, 2017-now
- Research: CS Education, software testing, interdisciplinary applications
- Dept. chair (2X), Chair and Past Chair of ACM-W

Intro #2: Non-Technical Me

- Partnered (34 years, why marry now?)
- One daughter, 26 (library science!)
- Other fun: it’s all about the bike
- And travel, cooking & baking, reading mysteries.....
Interdisciplinary combination of CS & other fields

**Themed Introductory CS**
- 14% women in intro → 38% women
- Students came from 7 majors → students came from 30 majors!
- 58% indicated interest in taking more CS
- 59% wanted to see computing courses in their own major
- Fed into intermediate courses in CS that are not on major track, e.g.
  - Modeling & simulation
  - Data visualization

**Incorporating computing into non-CS courses**
- Added computing in discipline specific ways (chiefly through OTS software)
- “Infused” courses in 15 disciplines
- 74% said that the computational component helped them understand the disciplinary material!
What’s next? Core computing concepts across the curriculum!

Students outside of CS are more diverse!

- Develop set of core computing concepts.
- Work with faculty outside of CS to incorporate core computing concepts into their courses.
- Run modified courses, evaluate student understanding of computing concepts.
- Stealth approach to achieving computing across the curriculum without requiring it!
- Reach a much broader and more diverse student population!

Work supported by the National Science Foundation under Grant No. CNS 1935113
Brodley
Professional and Personal Milestones

• BA in Mathematics, McGill University 1985
• Various dead-end programming jobs 1985-1988
• Started graduate school, UMASS 1998
• Marriage 1990
• Ph.D. awarded 1994
• Benjamin born 1994
• Started as assistant professor, Purdue 1994
• Matthew born 1998
• Tenure awarded 2000
• Divorce 2000
• Moved to Tufts as a full professor 2004
• Chair 2010
• Marriage to George (and son Chris) 2014
• Moved to Northeastern to be Dean 2014
• Exec Dir., Center for Inclusive Computing 2019
What makes me happiest
REPROGRAM YOUR CAREER. REWRITE YOUR FUTURE.

JOHANNA BA POLITICAL SCIENCE AND INTERNATIONAL AFFAIRS ALIGN MSCS '19

WILLA BS SOCIAL SCIENCES ALIGN MSCS '18
Northeastern’s Align MS in CS for non-majors

2 semesters of Align bridge + 2 semesters of MSCS classes + 1 six-eight month co-op + 1 semester of MSCS classes = Master’s Degree in Computer Science
Located in Tech Hubs across North America

Seattle 2013
San Francisco 2019
Silicon Valley 2017
Boston 2016

Offered at these four locations with more to come
Strong demand for breaking into tech

Align Enrollments

- 2013-2014: 11
- 2014-2015: 23
- 2015-2016: 44
- 2016-2017: 112
- 2017-2018: 211
- 2018-2019: 397
- 2019-2020P: 450
- 2020-2021P: 600
- 2021-2022P: 750
- 2022-2023P: 1000

CRA-WP
Computing Research Association
Widening Participation
46% of all Align students are women
With the Fall 2019 cohort of 273 students, we will have 778 current Align students.

Our incoming class reflects similar demographics to the US population.

<table>
<thead>
<tr>
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<th>National % BS/BA Degrees</th>
<th>National % CS Degrees</th>
<th>Khoury % Fall 2019 Align Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women</strong></td>
<td>56%</td>
<td>19.5%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>URMs</strong></td>
<td>25%</td>
<td>10%</td>
<td>26%</td>
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Students come from 80+ disciplines
Khoury industry partners

150+ co-op/internship placements and 137 alumni in tech roles at leading firms
Facebook invests to expand Northeastern Computer Science Master’s program for women and underrepresented populations.
The Center for Inclusive Computing

We envision a world in which women are fully represented—and thriving—as technological contributors, leaders, and innovators.

Closing the Demographic Gaps

The center’s mission is to substantially increase the representation of all people majoring in computing across the United States. We do this by partnering with research universities and universities with large computing programs (CS) graduates or more per year to implement evidence-based practices that support the recruitment, enrollment, and graduation of historically underrepresented groups majoring in computing.

To succeed, we seek partners that demonstrate a combination of these factors:

- **Readiness.** The unique characteristics of the institution will enable the ambitious increase of women and underrepresented groups in computing.
- **Level of commitment.** Key institutional leaders are committed and willing to lead and sustain the initiatives.
- **Impact.** The initiative is broad-based and has the potential to transform the institution and computing profession.
- **Urgency to act.** There is a clear need and urgency to address the underrepresentation of women and underrepresented groups in computing.
Tips for Department Inclusivity

1. Survey students regularly to identify institution-specific growth opportunities.
2. Optimize the intro course to be welcoming regardless of CS exposure.
3. Monitor performance patterns to identify structures or culture with differential impact.
4. Support new pedagogies to improve students' learning and experience.
5. Train faculty to respond to bias to address toxic culture in and out of the classroom.
6. Foster student community to create effective peer mentoring programs.
7. Show students the breadth of CS to engage beginning students with varied interests.

We want to improve our department based upon your feedback!
You don't need prior CS experience to succeed!
We should investigate why some groups have higher rates of attrition!
Teachers are encouraged to adapt effective teaching practices!
We are all responsible for creating a positive dept. culture!
Funding for snacks can be helpful for building community!
CS is a broad field with connections to many other disciplines!

@CSTeachingTips CSTeachingTips.org Funded by NSF #1339404
QUESTIONS AND DISCUSSION
What is CRA-WP?

*Individual & Group Research Mentoring*

**Undergrads:** Undergraduate Research Experiences (CREU & DREU), Research-Focused Scholarship opportunities at GHC (GHC Research Scholars)

**Grad Cohort:** Group Mentoring of Graduate Students (Grad Cohort for URMD & Grad Cohort for Women)

**Grad Students & Academics/PhD Researchers:** Mentoring Tracks @ GHC, Returning Scholars @ GHC, Group Mentoring for Early & Mid Career @ CMW

2400+ students & PhDs a year

Stay in touch: cra.org/cra-wp, Twitter: @CRA_WP, Facebook: CRA-WP, Linked-in: CRA-Widening Participation
CRA-WP Events at GHC

• Visit the CRA-WP Booth in the EXPO to learn more

• Attend another CRA-WP Session
  Building Your Professional Persona Session, 4 – 5 pm, OCCC W308D