INCREASING DIVERSITY IN COMPUTING IS EASIER THAN YOU THINK:

SOME SMALL STEPS THAT CAN MAKE A BIG DIFFERENCE

Moderator: Mary Hall, University of Utah

Panelists: Manuel Pérez-Quiñones, UNC Charlotte
                   Richard Ladner, University of Washington
                   Diane Levitt, Cornell Tech

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PURPOSE OF PANEL

Premise:

• The computing field is not nearly as diverse as the users of the technology it produces.
• Diverse teams have been shown to produce better results.
• Tech skills are valuable for everyone. Computing expertise impacts educational and career trajectories.
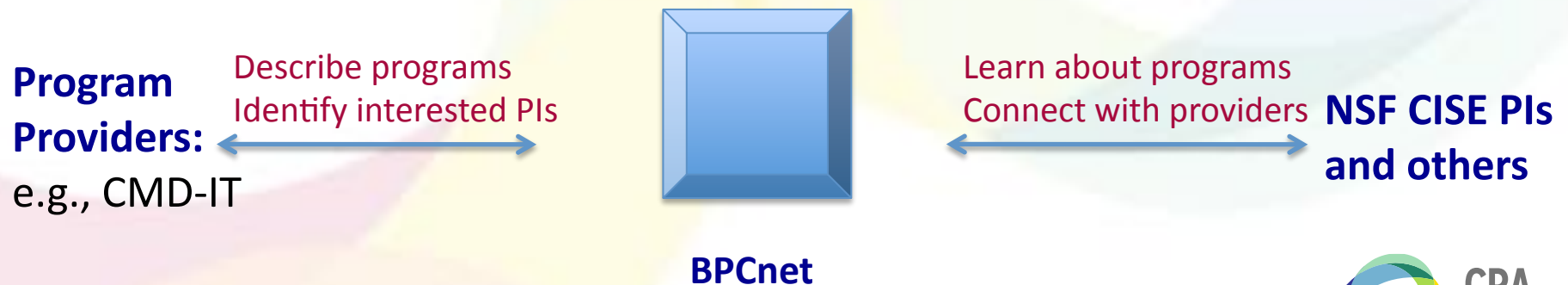
Goal of Today's Panel:

• Hear from experts working on increasing diversity in computing.
• Aid typical departments to identify feasible steps to increase diversity of their programs and learn about available resources.
• Share information on best practices.
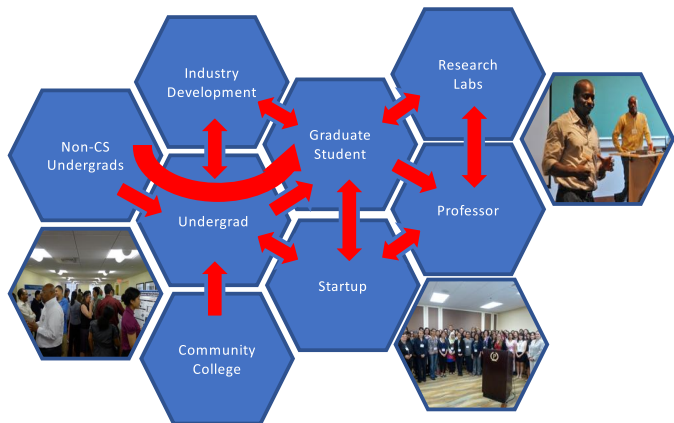
TOPICS FOR PANELISTS AND AUDIENCE

- Widely used and proven programs
  - for recruitment, development and retention of diverse student populations
- Low-cost, high-reward programs
- Creating a community for students from underrepresented groups
  - particularly needed in universities that are not very diverse
- Things to think about in creating a welcoming environment for all students.
  - because students from different underrepresented groups have unique needs
- Partnering with established organizations and institutions.

BPCNET RESOURCE PORTAL

- BPCnet (BPC = "Broadening Participation in Computing")
  - A resource portal hosted by CRA that will connect NSF CISE PIs and others to proven programs to broaden participation in computing
  - Initial deployment in *January 2019*
- Goals
  - More widely leverage existing NSF BPC programs
  - Increase impact of NSF CISE PIs' broadening participation efforts
  - Assist PIs in impactful broadening participation efforts with measurable outcomes

Program Providers:
e.g., CMD-IT

Describe programs
Identify interested PIs

Learn about programs
Connect with providers

NSF CISE PIs and others

BPCnet

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CRA-W: Fostering Research Pathways

- **Goal: CRA-W strives to ensure that its activities have a positive impact on the success and participation of all underrepresented groups in CSE.**
- **Established in 1991, CRA-W programs have directly impacted over 25,000 women, under-represented minorities, and people with disabilities.**
- **This year**: **3,700** undergraduates, graduate students, and computing research professionals were supported or mentored through CRA-W programs.

Programs:

Distributed Research Experiences (DREU) and **Collaborative Research Experiences (CREU):** Summer or Academic year research experiences for women and URM undergraduates.

Grad Cohort Workshop: Bring together hundreds of women or (new in 2018) under-represented minorities for cohort building and career skills mentoring.

Discipline-Specific Workshops (DSW): Funding available for researchers to organize and host workshops offering mentoring and technical knowledge in their CS sub-field.

Distinguished Lecture Series (DLS) Highlight research from senior women and URM researchers

Mentoring Tracks at Tapia & Grace Hopper: Research and career mentoring advice at major conferences.

CRA-W GHC Research Scholars: Travel funding and advice toward graduate school and research careers in computing.

CRA-W
Computing Research Association
Women

CERP
Computing Research Association
Evaluation

What is Data Buddies Survey?

- Annual survey of undergraduate and graduate students in computing degree programs.
- Collects data on **student satisfaction**, **career aspirations**, **perceptions of professional environment and support structures**, and more!

How does it work?

- Data Buddies departments distribute a survey link to their students affiliated with their computing programs and classes. **CERP does the rest!**
- After each survey, departments receive a **customized report** comparing their students to students in similar institutions.

Your Institution at a Glance: Undergraduate Students
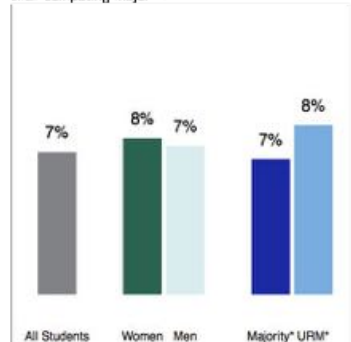April 19, 2018

Satisfaction with the computing program
At your institution, the following are satisfied with the computing program**:

All Students 73%
Women 69%
Men 75%
Majority* 72%
URM* 75%
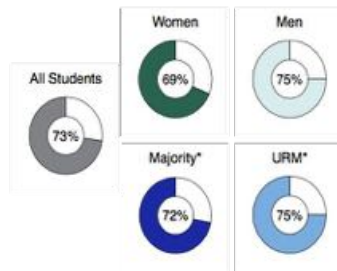
Thought about leaving computing major
At your institution, the following thought about leaving their computing major**:

All Students 7%
Women 8% Men 7%
Majority* 7% URM* 8%

	Your Institution Mean (SD)	Similar Institutions Mean (SD)	Sig.
find employment in my area of computing interest	4.20 (1.05)	4.25 (0.93)	
become a leader in the field of computing	3.37 (1.30)	3.43 (1.12)	
win a computing-related contest (e.g., programming contest, robotics contest, hackathon)	3.76 (1.37)	4.09 (1.21)	
get admitted to a graduate computing program	3.37 (1.13)	3.12 (1.17)	
complete my undergraduate degree in computing	4.05 (1.21)	3.50 (1.24)	*
quickly learn a new programming language on my own	4.22 (0.98)	4.01 (1.00)	
clearly communicate technical problems and solutions to a range of audiences	3.95 (1.18)	3.94 (0.96)	
n	59	8006	

(*) $p \leq .05$ and Cohen's d or $h \geq .30$; (N/A) $n < 5$ or test criteria were not met

Service activities for faculty (CS@VT)

- Encourage faculty to engage in service activities that support the mission of broadening participation
- Provide a "menu" of options for service engagement with different levels of participation
  - Speaking at High School events
  - Hosting URM+W+D in summer research experience
  - Service activities in conferences (Tapia, GHC)
- *Require participation in 1 diversity activity every year.*
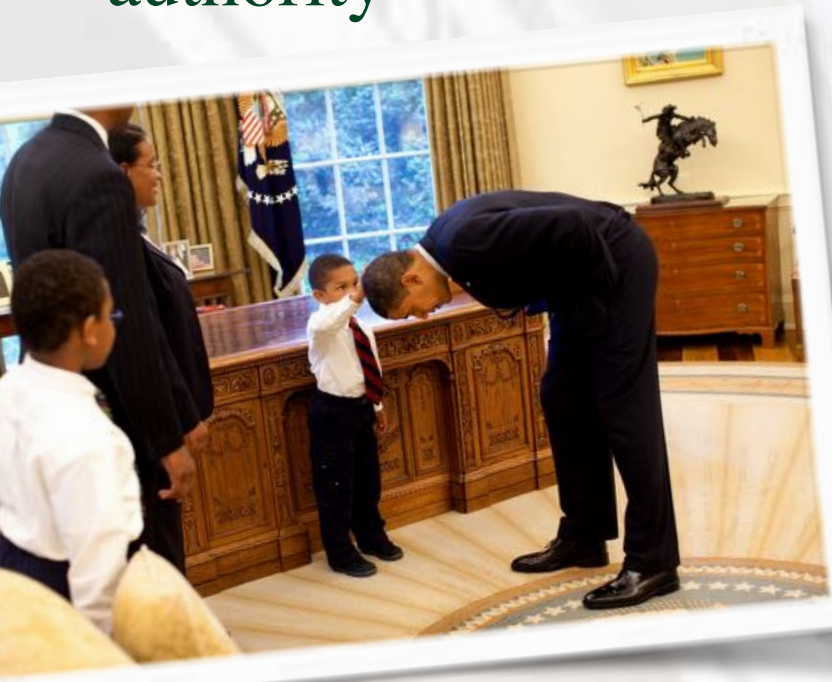
Help your student find peer groups

- Within (or close enough to) Computing
  - Women in Computing (ACM-W and others)
  - National Society of Black Engineers (NSBE)
  - Society of Hispanic Professional Engineers (SHPE)

- Partner with other campus-wide student orgs to help create peer groups for your students
  - Black, Latinx/Hispanic, LGBTQ

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Send URM/W/D to conferences

- Talk to any female student after coming back from GHC, or any URM student after coming back from Tapia
  - Their experiences are nothing short of miracles

- Encourage participation and to apply for scholarships
- Before the conference, introduce them (virtually) to other colleagues, encourage them to meet with them
- Hold meeting after the conference
  - Have the students pass information to other students
- Use your Industrial partners to fund travel to conferences

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Representation Matters

- It is more than just quotas or for *affirmative action* reasons
- Important for all to see ourselves in people in positions of authority

- To provide services that are sensitive or appropriate for particular groups

We deleted this tweet due to the use of the incorrect Spanish phrase to say "the year of the woman." The phrase is "el año de la mujer."

NPR @NPR · 46m
There are more than 3,000 women running for elective office in Mexico. Some Mexicans are calling 2018 "el ano de la mujer," which translates to "the year of the woman."

Same struggle, different difference

- All groups underrepresented in computing (and society) go through the same struggle
  - … but the reason for the struggle is different.

- Don't buy into the idea of…
  - "we'll solve the problem for women first and then we will work on minorities"
  - "we don't have to worry about accessibility until we have a student with disabilities in the major"

Intersectionality

- Consider this situation
  - Your department has a 50% drop rate for female students in freshmen year
  - You have a gender problem, right?
- But what if…
  - What if I tell you that 40% of female students in freshmen year are URM?
  - What if the URM/W are over-represented in your drop out group?

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Set goals that are reasonable for your institution

- A tale of three universities
  - University of Puerto Rico - Mayagüez
    - 99% of students were Latinos (Puerto Ricans)
    - Very competitive department, retention not a problem
  - Virginia Tech
    - Recruitment for diversity was a challenge,
    - Retention was not an issue.
  - UNC Charlotte
    - Recruitment for diversity is not needed,
    - Retention is a problem.

Diversity as an Asset not a Deficit

- Avoid discussions (and policies, practices, strategies) that focus on what is wrong and what is broken

- Discuss diversity from an asset point of view
  - Why is it good to have a diverse work environment?
  - What would this diversity bring to your classrooms that you are currently lacking?
  - What would a diverse workforce in computing provide to society?

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Students with Disabilities

Richard E. Ladner
Snowbird 2018

The Allen School is a community that celebrates and values differences among its members. We strive to create an inclusive environment for people of all backgrounds. … A commitment to diversity and inclusion is a fundamental part of our mission as a public educational institution. We have an obligation to uphold these values.

Access Computing

Richard E. Ladner, PI
Sheryl Burgstahler, Co-PI and Director
Jacob O. Wobbrock, Co-PI
Andrew J. Ko, Co-PI

Founded 2006
Broadening Participation Alliance

Goal: Increase the participation and success of students with disabilities in computing fields.

Facts

- 11% of college students have a disability.
- Relatively evenly distributed throughout the nation.
- Higher percentages in community colleges.
- 40% 6 year graduate rate (compared to 60% for non-disabled students).

What can your department do?

- Attitudes

- Infrastructure

- Curriculum

- Faculty

Attitudes

- Welcoming, not just compliance
- Diversity includes disability
- Disabled students seen in images

Infrastructure

- Accessible website

- Captioned videos

- Accessible labs and offices

Curriculum

- Teach accessibility related topics
- Highlight accessibility achievements
  - Optical character recognition
  - Speech synthesis
  - Speech recognition
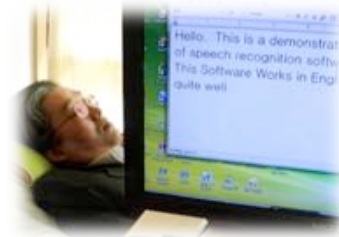
Kurzweil Reading Machine
(circa 1978)

Faculty

- Hire and promote diverse faculty
- Take risks – hire in new areas
  - HCI (Human Computer Interaction)
  - ICTD (Information and Communication Technology for Development)
- Reward impactful broadening participation activities, not just research and teaching

K-12 EDUCATION

CORNELL TECH

BUILDING EQUITY IN COMPUTING THROUGH K-12 EDUCATION

- Catalyze K-12 CS
- Bring people together
- Leverage the campus

SPACE

EXPERTISE

LET'S CODE ROOSEVELT ISLAND

FAMILY CODING NIGHT

FAMILY MAKER NIGHT

PS/IS 217 MAKERS' CORNER

TECH HOPPERS
GIRL SCOUT FIRST LEGO LEAGUE

CSTA

PROFESSIONAL DEVELOPMENT
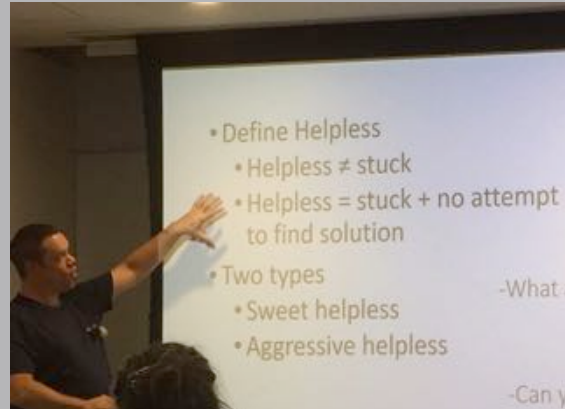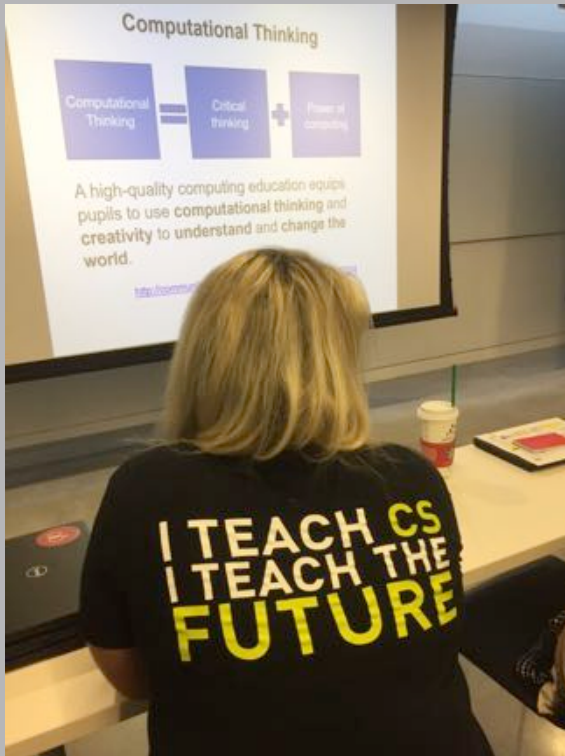
Tips for
BPC Plans

CSTeachingTips.org/Tips-for-Broadening-Participation

☑1 Survey students regularly
to identify institution-specific growth opportunities.

We want to improve our department based upon your feedback!

☑2 Optimize the intro course
to be welcoming regardless of CS exposure.

You don't need prior CS experience to succeed!

☑3 Monitor performance patterns
to identify structures or culture with differential impact.

We should investigate why this group has higher rates of attrition!

☑4 Support new pedagogies
to improve students' learning and experience.

Teachers are encouraged to adopt new teaching practices!

☑5 Train faculty to respond to bias
to address toxic culture in and out of the classroom.

We are all responsible for creating a positive dept. culture!

☑6 Foster student community
to create peer mentoring programs.

We fund student groups that provide peer mentoring!

☑7 Show students the breadth of CS
to engage students with varied interests.

CS connects to many other disciplines!

csteachingtips

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INSTITUTE

WiTNY

TOP 10 LIST

1. *Measure* your enrollment, demographics, etc. regularly to identify problem areas and track changes, on your own, or with the CRA Data Buddies.

2. *Optics matter:* include pictures of URMD students in websites and printed materials. Artwork, examples in class, etc. should appeal to all students and not reinforce stereotypes.

3. Work with women and URMD students in *undergraduate research projects*, e.g., CRA CREU and DREU.

4. *Organize faculty* within your department. Make a sign-up list of diversity activities for faculty. Create a departmental plan for NSF Broadening Participation that faculty can support.

5. Create a *community* for URMD students through sponsoring *student organizations*, e.g., ACM-W, NCWIT, AAMCS, IAAMCS, NASBE and SHPE, and send students to *Grace Hopper and Tapia celebrations*, or simply encourage them to apply for conference scholarships.

6. *Make departmental infrastructure accessible and internationalized:* classrooms, labs, offices, websites, videos, etc. Use international interfaces and character sets.

7. *Recruit URMD TAs, professors, advisors, etc.:* so that students see someone who looks like them being successful in the field. This also helps build confidence of the TA.

8. Consider *curriculum enhancements* appealing to diverse students, e.g., accessibility courses, introductory courses that assume no computing background

9. Work with K-12 teachers (CSTA) and state curricula (ECEP) to *advance K-12 computing education* and improve the pipeline.

10. Organize *outreach events* that bring diverse K-12 students onto your campus.

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RESOURCES (INCOMPLETE LIST)

Special Issue on Broadening Participation from NSF BPC Alliances and their partners (overview article):

Quincy Brown. 2016. BROADENING PARTICIPATION. ACM Inroads 7, 4 (November 2016), 46-48. DOI: https://doi.org/10.1145/3008664

- CS for All, Exploring Computer Science: http://www.exploringcs.org/
- Expanding Computing Education Pathways: http://ecepalliance.org/
- STARS Computing Corps: http://starscomputingcorps.org/
- Access Computing: http://www.washington.edu/accesscomputing/
- Computing Alliance of Hispanic Serving Institutions: http://cahsi.cs.utep.edu
- National Center for Women in Information Technology: http://www.ncwit.org (partners ACM-W, http://women.acm.org, and Anita Borg Institute, http://anitab.org)
- CRA-W: http://cra.org/cra-w/all-projects/
- Summer Math and Science Honors Institute: http://www.smash.org
- Center for Minorities and People with Disabilities in Information Technology: http://www.cmd-it.org

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