Going Beyond the Platitudes of Equity: Developing a Shared Vision for Equity in Computer Science Education

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ABSTRACT

Efforts to broaden participation in computing address how systemic school structures, educator preparation, and curriculum can provide inclusive learning spaces for all students. The emerging multiplicity of scholarship in computer science (CS) education forwards diverse voices, perspectives, and positionalities, and together, provide a rich set of evidence-based narratives that can transform K-12 policies and practices. The four projects featured in this panel bring together CS education efforts with varying methodologies focused on equity-oriented pedagogies and learning for all youth across the US. This panel will focus not only on sharing the multi-pronged efforts of the featured projects, but also on developing a shared vision among participants and panelists for what "equity" can and should be in the future of both SIGCSE and CS education as we celebrate SIGCSE's 50th anniversary. By highlighting the work of *projects* rather than *individuals* in this panel, audience members will have the opportunity to learn about how collaborative efforts create and examine contexts for equity in CS education across diverse stakeholders, while also providing a richer base for constructing visions of equity that go beyond mere platitudes, toward action items for broadening participation in computing.

1. SUMMARY

The Computer Science for All Movement is gaining momentum nationwide as administrators, educators, parents, students, and researchers recognize the pressing need to democratize access to quality computing education for *all* students [e.g., 1, 2, etc.]. This effort to broaden participation in computing is a united response to research revealing that youth of color and females have been systematically denied access to CS courses and inclusive pedagogy, especially in low-income schools, resulting in segregated CS education and career pathways [3]. The variety of efforts to broaden participation in computing—with the creation of new curricula, teacher education programs, policy, and assessments—has led to a growing body of research focused on

equity in CS education. Yet questions remain about the impacts of CS for All efforts on historically underrepresented students' experiences and engagement with CS, teachers' perceptions of their roles in broadening participation in computing, pedagogical practices for inclusive CS learning, and structures/policies impacting teaching and learning.

Responding to SIGCSE's 50th anniversary call to create a vision for the next 50 years—especially around topics of broadening participation, diversity, and K-12 education—this panel brings together four different CS education efforts focused on equity-related issues in CS education. Representing a range of methodologies and contexts across the US (from research-practice partnerships to non-profits to university organizations) that seek to have direct impact on supporting equity-oriented pedagogies and learning experiences for *all* youth, presenters will share how: (1) equity is being defined in their research/program, and (2) their CS for All efforts impact equity issues in CS education. This will be followed by an effort to design a shared vision not only for what we believe "equity" should mean for SIGCSE and the CS for All movement, but also, going beyond the platitudes of equity, what it should look like to take action based on this shared vision.

2. PANEL STRUCTURE

Unlike a traditional SIGCSE panel that typically highlights only 4 *individual* panelists, this panel brings together a larger number of people to represent 4 different *collaborative projects* geared toward addressing equity issues in CS education. While only one individual from each project will represent the teams on stage during brief panel presentations, all team members will be present to participate in the interactive aspects of this panel. We believe that having many people at the table representing collaborative work offers a more accurate representation of what the CS for All movement involves: not individuals working independently, but many people coming together to address equity issues pressing in their communities or in the nation at large. The goal of the panel is to share a range of perspectives across collaborators who have expertise in research, pedagogy, professional development, policy, and institutional change, toward developing a shared vision of what "equity" can and should look like, as well as specific action items to work toward for the SIGCSE and CS for All community. As such, the panel will begin with a 5-minute introduction to the session by the

moderator introducing the panelists and panel goals. This will be followed by 10-minute presentations by each project in which panelists will explain how their projects: 1) define equity in their work, and 2) seek to address inequity in CS education across either formal or informal K-12 learning contexts while addressing where they see room for improvement. Then, audience members can ask panelists (and their team members in the room) specific questions during a 10-minute Q & A, allowing time for attendees to digest ideas shared thus far. This will be followed by a 20-minute activity in which panelists and audience members will work together to create a shared definition of "equity" for CS education, as well as action items we want both the SIGCSE and CS Education community at large to achieve within the next 50 years. Following this discussion, the moderator will incorporate all ideas from the panel toward developing a white paper (authorship including all willing panelists and audience members) to share with the SIGCSE community at large. This white paper will describe the range of ideas shared during the panel, offering a starting point for how our community of scholars, educators, students, parents, and community organizers can continue to take action, so that computing can truly be for *all* in the next 50 years of SIGCSE and beyond.

3. "REAL-CS" Team (UCLA + Univ of OR)

"REAL-CS" (Researching Equity, Access, & Learning in CS Education, funded by the NSF) brings together educators and researchers across the University of Oregon and UCLA to address equity issues in high school CS education across three strands: 1) teacher education and professional development; 2) policy and public engagement; 3) student learning research. Building on over a decade of research focused on democratizing access to K-12 CS education for youth historically underrepresented in CS [3, 4], the creation of the Exploring Computer Science curriculum and professional development [5], and policy/outreach efforts [6, 7], the REAL-CS team offers insights into how our current project supports equity-oriented teacher learning and practice, efforts to ensure CS for All reaches youth throughout the state of California, and why student identity is important to support within the context of introductory CS high school classrooms.

4. "BRIGHT-CS" Team

BRIGHT-CS (*Building Student Retention through Individuated Guided coHort Training in CS*) is an NSF-funded research project that harnesses the power of mentoring, peer learning, grit and resilience to put cohorts of middle school black girls at the core of the STEM-CS pipeline model. BRIGHT-CS supports two objectives: 1) to create a computing learning ecosystem for K-12 students, particularly focused on black girls [8, 9, 10]; and 2) to research the impact of the learning ecosystem in a longitudinal manner. To create a computing learning ecosystem, we use a cohort model of positive peer and near-peer mentors among black girls in computing with an emphasis on (1) empowerment and leadership development for black girls, (2) comprehensive computer science and computational thinking experiences, and (3) partnerships with schools, colleges/universities, and non-profit and community organizations. In investigating the effectiveness of this learning ecosystem, an important outcome of this research is to determine and inform best practices for broadening participation to other student groups traditionally viewed as marginalized.

5. Kapor Center

The Kapor Center investigates how to broaden participation in computing for underrepresented students (with a particular focus on girls of color) through: 1) analyses of differing levels of access to CS courses in California school districts, 2) examinations of strategies and interventions to bring about more equitable outcomes for all students, and 3) providing direct programs for low-income first-generation high school students to learn rigorous CS. The Kapor Center also documents obstacles and barriers to participation that exist despite access to CS courses, to directly inform the design and implementation of the next generation of computing education initiatives. Kapor Center findings contribute to ongoing district and state-level implementation plans, such that continuous improvement can be made to increase the number of girls and underrepresented students with access to CS courses, enrolled in CS courses, and demonstrating successful completion and persistence in computing sequences. This research on models for broadening participation in computing education can be utilized across local districts, states, and at the national level.

6. Constellations Ctr for Equity in Computing

The Constellations Center views equity as a structural matter. Students of color are facing all of the challenges associated with the intersection of race, class, and education in computing education that manifests itself in their having unfair access to capable teachers of CS or schools that engender the composite set of skills upon which a solid computing education can be built. As a pledge to provide access to high level computing education to underrepresented students, the Center's solution to this crisis is to build and deploy a hybrid model with solid instruction of online computing content and a professional development strategy that builds teacher efficacy over time. This hybrid instruction model alleviates novice computing teachers from being the sole subject matter experts and allows them the opportunity to increase their efficacy in the knowledge and skills comprised in the computing course they are facilitating over a sustained period of time.

7. REFERENCES

[1] Smith, M. 2016. *Computer Science for All.* The White House President Barack Obama. https://obamawhitehouse.archives.gov/blog/2016/01/30/computer-science-all.

[2] CS for All. https://www.csforall.org.

[3] Margolis, J., Holme, J., Estrella, R., Goode, J., & Nao, K. 2017. *Stuck in the shallow end: Education, race, and computing*, revised ed. MIT Press.

[4] Exploring Computer Science. http://exploringcs.org.

[5] Goode, J. & Chapman, G. 2016. *Exploring Computer Science Curriculum.* University of Oregon.

[6] Alliance for California Computing Education for Students and Schools (ACCESS). http://access-ca.org.

[7] Computer Science for California (CS for CA). http://access-ca.org/csforca/.

[8] Traphagen, K., & Traill, S. (2014). How Cross Sector Collaborations are Advancing STEM Learning. Los Altos, CA: Noyce Foundation.

[9] Casey, B. (2012). STEM Education: Preparing for the Jobs of the Future. Washington DC: US Congress Joint Economic Committee.

[10] National Science Foundation, & National Center for Science and Engineering Statistics. (2013). Women, Minorities, and Persons with Disabilities in Science and Engineering 2013 (Special Report NSF 13-304). Arlington, VA: National Science Foundation