

Infusing Equity and Inclusion in K-12 Computer Science Teacher Development

Bryan Twarek (moderator)
Computer Science
Teachers Association
Chicago, IL, USA
bryan.twarek@csteachers.org

Charity Freeman
Discovery Partners Institute
University of Illinois Chicago, IL,
USA cfreeman.chicago@gmail.com

Michelle Friend, Ph.D.
Teacher Education Department
University of Nebraska at Omaha
Omaha, NE, USA
mefriend@unomaha.edu

Maya Israel, Ph.D.
College of Education
University of Florida
Gainesville, FL, USA
misrael@coe.ufl.edu

Lilibeth Mora
Vallejo City Unified School District
Vallejo, CA, USA
lilibethmay@gmail.com

Meg Ray
Cornell Tech
New York, NY, USA
meg@megrays.nyc

Abstract—Most states identify content knowledge, and to a lesser extent pedagogical content knowledge, as the primary criteria for credentialing or authorization to teach computer science. However, there is an additional set of knowledge, skills, and dispositions related to equity and inclusion that are critical to effectively teach computer science to all students. The *2020 CSTA Standards for CS Teachers* were designed to articulate a broad vision for what is required of teachers to prepare their students to effectively and equitably meet the learning outcomes delineated in K-12 CS standards and the *K-12 CS Framework*. One of the five teacher standards is focused on equity and inclusion, and this was also used as a cross-cutting theme throughout the other four standards. In this panel, authors of the standards and teacher development leaders will discuss how equity and inclusion can and must be infused into both the initial and ongoing development programs of K-12 computer science teachers.

Keywords—equity, inclusion, teacher education, professional development, K-12 instruction, standards, broadening participation.

I. SUMMARY

A. Background and Relevance to RESPECT Community

Broadening participation in computing has long been a major emphasis in computer science (CS) education. Related issues such as what populations we consider, how disenfranchised populations fare, and their rates of retention and achievement within CS education programs are central to equitable computing and the aspirational goals of CSforAll. While the goals of broadening participation are admirable, the *2020 State of CS Education* report makes it clear that equitable CS education is still far from current practice [1]. Justice-centered teacher development is critical to realizing those goals and must receive greater priority.

The *2020 CSTA Standards for CS Teachers* [2] articulate a broad vision for what is required of K-12 teachers to prepare all of their students to effectively learn computer science. Equity and inclusion are core to this vision and incorporated as a set of knowledge, skills, and dispositions in both a discrete standard and through line of the other four standards. Panelists will discuss the design of this justice-oriented vision and how to realize it through teacher development.

B. Intended Audience

The intended audience are people are interested in the development of K-12 CS teachers, through both pre-service and in-service programs. These include K-12 teachers, K-12 administrators and coaches, professional development (PD) providers, schools of education, researchers, and policymakers.

C. Goals

The purposes of this panel are to: (1) articulate equity-focused knowledge, skills, and dispositions necessary for CS teachers to effectively reach all students, (2) discuss the current realities and challenges of fully integrating these in teacher development programs, and (3) explore promising approaches and ideas for developing justice-centered teachers at scale.

II. PANEL STRUCTURE

The moderator will briefly introduce each panelist, plus the purpose and structure of the session (<5 minutes total). He will prompt attendees to ask questions and share ideas throughout the session using a crowdsourcing tool. He will briefly introduce how equity and inclusion are integrated within the *CSTA Standards for CS Teachers* and then prompt discussion that is organized into three sections, each 10-15 minutes in length. Panelists will respond to different questions within a section based on their expertise. The moderator will facilitate a natural-flowing conversation, aided by some of the following questions:

1. **Vision:** What teacher knowledge, skills, and dispositions are necessary to create an equitable and inclusive CS classroom? How are these delineated in the teacher standards? Should CS teachers be responsible for advocating for equity beyond their classrooms?
2. **Instructional Approaches:** What shifts from common practice are required for teachers to enact equity in CS classrooms? What are high leverage practices and instructional approaches? What are some of the challenges to teachers creating inclusive classrooms?
3. **Teacher Development:** How can we develop justice-centered teachers at scale? How can programs prioritize equity and inclusion amidst other important outcomes

(e.g., content knowledge, familiarity with curriculum)? What are some of the challenges to, and successes with, more fully integrating equity and inclusion into teacher development programs? How does this vary across pre-service and in-service programs?

Questions and ideas from attendees will be incorporated throughout the discussion as they fit into these three broad sections. Plus, we will reserve about 10 minutes at the end of the session to discuss additional questions from attendees.

III. POSITION STATEMENTS

A. Charity Freeman

Charity Freeman manages teacher training programs at Discovery Partners Institute, focusing on building teacher capacity in computer and data science/analytics at the high school and community college levels. Previously, Freeman was a CS teacher at Lane Tech College Prep, the largest of the Chicago Public Schools. She also facilitated district-wide PD workshops for high school educators around the implementation of the Exploring Computer Science curriculum. As an inaugural CSTA Equity Fellow, Freeman supports the development of ongoing, peer-to-peer professional learning experiences focused on addressing issues of equity in CS classrooms.

Freeman will speak to her ongoing work that emphasizes the identification, critique, and subversion of systemic and social barriers to equitable access, engagement, and achievement in CS among historically marginalized groups, both within and beyond the classroom. She will share how she enacts equity, develops an inclusive learning environment, and ensures students have agency and voice through the implementation of critical pedagogy and social justice-oriented teaching practices.

B. Michelle Friend

Michelle Friend, Ph.D., is an Assistant Professor of Teacher Education at the University of Nebraska at Omaha, where she teaches the CS Teaching Methods course required for state credentialing. She formerly taught CS at The Girls Middle School in Mountain View, CA. Her research focuses on equity in CS education, particularly on how women become and stay interested in computing careers, what experiences in and out of school can support interest in CS for members of groups underrepresented in CS, and how stereotypes of computer scientists impact individuals who do not embody those stereotypes.

Dr. Friend will speak to the role of teacher preparation programs in ensuring that CS teachers do not replicate the culturally exclusive practices that have been historically common, but adopt high-leverage pedagogies to include all students. As the co-chair of the CSTA PD Committee, she will also share trends in how PD providers self-report inclusion of equitable and inclusive practices in their programs.

C. Maya Israel

Maya Israel, Ph.D. is an Associate Professor of Educational Technology at the University of Florida, School of Teaching and Learning and is the director of the Creative Technology Research Lab (CTRL). Dr. Israel's research focuses on studying instructional practices that support students with disabilities and other struggling learners' meaningful engagement in K-12 CS

education. In addition to her research, she was a writer on the *K-12 CS Framework* and the *CSTA Standards for CS Teachers*, and she works with multiple school districts on meaningfully including all learners in CS education initiatives.

Dr. Israel will speak to how teachers intentionally include students with disabilities using equitable instructional practices to support diverse learning needs within CS classrooms. She will share strategies for preparing teachers to apply the Universal Design for Learning (UDL) framework in K-12 CS, to use metacognitive strategies to support struggling learners, and to use other instructional strategies to ensure students with disabilities can fully access and engage in content.

D. Lilibeth Mora

As the Equity Teacher Leader for a northern California school district, Mora directs the implementation of strategies that focus on equity, inclusion, and social emotional learning. As the CSTA Sacramento chapter leader, she co-directs a K-12 CS community of practice that shares resources and strategies to connect with postsecondary and industry, increase student enrollment and participation, and create opportunities for professional growth. As a CSTA Equity Fellow, she develops professional learning experiences that promote equity in CS. She co-lead the design and implementation of the CSTA Equity In Action Summit that took an action-oriented approach to improving equity in and access to CS for all students.

Mora will speak to the role that school districts and professional learning communities can play in supporting the ongoing teacher development related to equity and inclusion, as well as the need to train teachers of all levels to integrate social emotional learning into their practice.

E. Meg Ray

Meg Ray is a CS education consultant and founding Teacher in Residence at Cornell Tech, responsible for the development of the CS Coaching Card Deck. Meg teaches CS methods courses at NYU and is an experienced high school computer science teacher and instructional designer. She was a writer for the *CSTA Standards for CS Teachers* and the *CSTA K-12 CS Standards* and was a special advisor to the *K-12 CS Framework*. She is part of the UDLACS RPP grant and is an INSPIRE CS-AI Fellow at MIT's Teaching Systems Lab. As co-lead of the CSTA inclusive teaching working group with Dr. Israel, Ray and colleagues have synthesized three interrelated pedagogies: UDL, translanguaging, and culturally responsive pedagogy [3].

Ray will speak to the need for a unified and intersectional lens for implementing these inclusive practices in teacher preparation and development. She will share her experience working with pre-service teachers on counteracting biases and supporting multilingual learners with disabilities, as well as her experience coaching CS teachers as they incorporate UDL into their instructional practices.

REFERENCES

- [1] Code.org, CSTA, & ECEP Alliance. (2020). *2020 State of Computer Science Education*. Retrieved from <https://advocacy.code.org/stateofcs>.
- [2] CS Teachers Association (2020). *Standards for CS Teachers*. Retrieved from <https://csteachers.org/teacherstandards>.
- [3] CS Teachers Association (2020). *Inclusive Teaching Pedagogies*. Retrieved from <https://csteachers.org/inclusiveteaching>.