

Experiences in Launching CS4Philly: Progress for Equity in and Access to CS Education for Philadelphia Children and Youth

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Abstract—CS4Philly is dedicated to ensuring that all of Philadelphia's children and youth have access to high-quality computer science (CS) education and are prepared for post-secondary success in the digital economy. Established in 2017, the mission of CS4Philly is to establish a sustained public-private partnership that raises awareness about the importance of computer science education, builds capacity within K12 systems and promotes equity and access to high-quality CS education, tech-skill building and training opportunities. CS4Philly is comprised of a group of local and regional STEM stakeholders, including universities, K-12 teachers and administrators, non-profits, and government offices. In this extended abstract, we report on progress in advancing the mission of CS4Philly.

I. INTRODUCTION

CS4Philly was established in 2017 as a call to action to bring access to equitable, inclusive, and high-quality computer science (CS) education for all of Philadelphia's youth. Bringing together a wide range of stakeholders aligned with this mission, the group includes teachers and administrative leadership for the School District of Philadelphia, the eighth largest school district in the United States; the Computer Science Working Group of the Philadelphia STEM Ecosystem, one of 56 national STEM Ecosystems that aim to increase STEM learning through a collective impact model; faculty and department chairs from 5 area universities; the Philadelphia CSTA chapter; community educational organizations; technology companies; organizations representing the Philly tech industry (e.g., Code4Philly, Technical.ly); and government agencies, including the Philadelphia Mayors office, the Pennsylvania Governor's office, and the Pennsylvania Department of Education. To connect to national efforts and resources, CS4Philly became a member of the CS4ALL consortium in March 2018, joining a national movement dedicated to making CS an integral part of the K-12 educational experience and supporting pathways to college and career success.

Since its formation, the CS4Philly initiative has focused on developing initiatives that 1) build partnerships and share resources among groups within the region that are interested in aligning with the CS4Philly mission, 2) increase awareness of and provide exposure to CS concepts, learning opportunities, and career paths, and 3) build capacity for high-quality elementary and secondary computer science education with a focus on equity and inclusion.

II. BUILDING PARTNERSHIPS

As the UNCF's National Director for STEM Initiatives, Dr. Chad Womack participated in the White House launch event of CS4All. Inspired by this event, Dr. Womack partnered with Dr. Naomi Hausman to launch a CS4All initiative in Philadelphia, serving as the founding co-chairs of CS4Philly. CS4Philly began developing partnerships by creating a professional community of practice among a cross-section of stakeholders. As a first step, we started by convening around a common objective with a clear set of tasks: submitting a grant proposal that centered on supporting common goals within the group to support CS education for all children and youth across Philadelphia. Following the proposal development process, there was great enthusiasm and excitement among the group to continue working together; several participants saw the value in convening such a diverse group of individuals and institutions engaged in CS and tech. CS4Philly began convening the group on a monthly basis around shared objectives to raise awareness and increase access to CS education in early 2017. Building on lessons learned by other similar groups, CS4Philly has established relationships with the leads of CS4All initiatives in NYC and Chicago, as well as the leads of the National CSforAll Consortium.

A year of building partnerships led to the development of the first annual CS4Philly Summit in December 2017. Held at Philadelphia City Hall, Mayor Jim Kenney announced the CS4Philly Bill of Rights, proclaiming that all of Philadelphia's children and youth have the right to access the knowledge, skills, and abilities needed to be creators in the digital economy, not just consumers, and to be active citizens in our technology-driven world. The focus on equity, particularly from a perspective of economic opportunity, was pointed to by Mayor Kenney being critical to "change the poverty numbers in this city". Representatives from across the city and state voiced their commitment to providing quality computer science education for *all* Philadelphia youth. Speaking at the Summit, School District of Philadelphia Superintendent William Hite delivered the message that "No matter what a student's future schooling or career track, they will benefit from developing their digital literacy skills and being exposed to the fundamentals of computer science."

Four news outlets ran stories on the CS4Philly Summit, increasing awareness of CS4Philly's mission. As a next step, CS4Philly planned to develop interactive community events for Philadelphia youth, parents, teachers, and administrators to increase awareness and provide exposure to computing concepts, learning opportunities, and career paths.

III. INCREASING AWARENESS AND ACCESS

CS4Philly launched CS4Philly Week in December 2018, which was Philadelphia's first city-wide celebration of National Computer Science Education Week. Sessions throughout the week were planned in different venues across the city that were designed to inspire learning, awareness, and advocacy among stakeholders, including civic, private, and public leaders in K-12 education, higher education, industry, community, and parents. Events included:

Student CS Experience. This full day program was designed to excite high school students about CS as a college and career pathway, build teacher interest in introducing CS concepts in the classroom, and raise awareness about opportunities for continued CS learning in and out of school. Organization of the event reflected the city-wide partnerships developed among university faculty, area schools, industry, and community organizations. An invitation from the School District of Philadelphia (SDP) was issued to all of its high school principals and Comcast NBCUniversal issued invitations to after-school programs they support. Students attended in school teams that included 1 teacher chaperone per school/program, 1 TechServ STEM Scholar per school, and 1-2 Comcast NBCUniversal Tech Mentor Professionals per school. Twelve CS4Philly volunteers designed and facilitated seven learning activity stations. Eleven high schools participated in the event: 6 special admission (i.e., magnet) schools, 4 city-wide admission schools, and 1 alternative education school.

More than 100 students from across Philadelphia engaged in hands-on computer science learning activities throughout the day, visiting seven activity stations in teams. The activities were created through a design lab process with members of the work group and tech professionals who are part of the Code4Philly local tech community. The concept was to design activities that would help students see the range and scope of what CS is, using the 7 Big Ideas in CS Principles framework to guide organization. Some activities were "unplugged," requiring no technology (i.e. Pizza Packets, Post-It Pandemonium), while others introduced low-cost devices such as Microbits, which were provided to the student to take home. Each school team was scheduled to rotate through four of the activities. Upon successful completion of four activities, students earned a badge as a "passport to digital citizenship and were given access to their work in an online portfolio.

K12 CS Teachers Professional Development. Two activities were hosted for K-12 teachers interested or currently engaging in teaching computer science. First, a hands-on workshop brought teachers from across Philadelphia to learn strategies for integrating computer science education in their

classrooms, with a focus on "making" and the arts as ways to center computational thinking activities. Second, with the goal of building community around the common goal of promoting equitable and high-quality education, teachers currently using the Code.org CS Discoveries and/or CS Principles curriculum were invited to a CS Teacher meet up, with a guided but informal conversation around the curriculum, equitable instructional practices, and ways to engage all students in computer science.

High School Counselor CS Ed Professional Development. This half-day professional development was targeted to provide Philadelphia school counselors with exposure to computer science concepts, including block-based coding and CS Unplugged activities. The session was hosted in partnership with The School District of Philadelphia, Temple University Department of Computer and Information Sciences, and Counselors for Computing (C4C), an initiative of the National Center for Women and Information Technology (NCWIT). NCWIT supported the participation of two facilitators who customized the C4C program for use in PA/Philadelphia teachers. Both facilitators are also current full-time school counselors (one in PA, one in NJ), which gave them great credibility with the participants. Twenty-six counselors from the School District of Philadelphia attended, representing 25 schools, including both high schools and middle schools. Working in partnership with the District, this CS4Philly event made it possible for the counselors to receive 48 professional development credits for their participation.

Community Leaders and Parents Forum. This two hour meeting served as a forum for community leaders and parents from neighborhoods across Philadelphia. Speakers from the Pennsylvania Legislative Black Caucus, the Pennsylvania Department of Education, the School District of Philadelphia, and the City of Philadelphia shared the message about the importance of CS education for all students to gain access to opportunities in the tech and innovation economy, and discussed opportunities for youth in Philadelphia to learn computer science principles and gain computational thinking skills. Parents and community leaders were invited to share their thoughts on gaps in awareness about and access to CS education, and ideas for enhancing offerings.

IV. BUILDING CAPACITY FOR CS EDUCATION

The School District of Philadelphia has adopted the PA state standards for CS education and is in the process of training in-service teachers to offer computer science courses in area high schools. To date, 13 teachers have been trained using the Code.org curriculum to offer a course aligned with the CS Principles framework. CS4Philly continues to collaborate with the School District of Philadelphia to find ways to support them in these efforts. A next step for CS4Philly is to continue to work with school administrators and teachers to understand how CS4Philly can complement their efforts, working with parents and communities to contribute to efforts to build capacity to provide equitable, inclusive, high-quality CS education for all children and youth across Philadelphia.