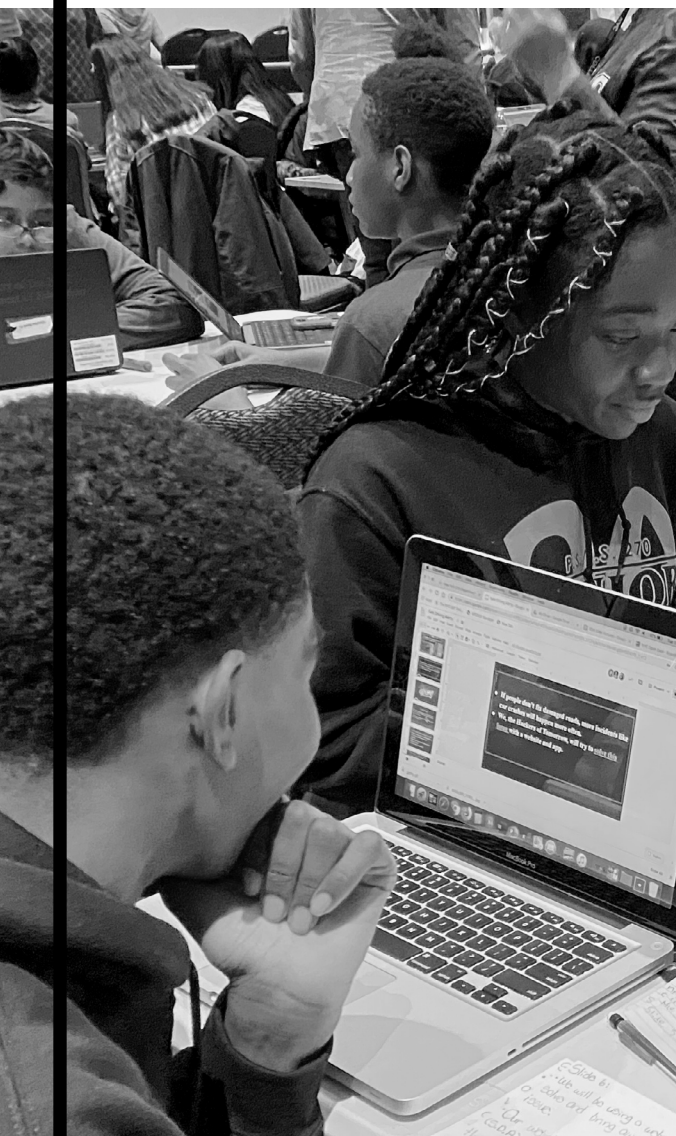


COMPUTER SCIENCE FOR ALL



Program Update

Year 5 Progress & Recent Developments

Prepared in partnership with:



Updated February 2021

Our Goal

Computer Science for All (CS4All) will ensure all NYC public school students—with an emphasis on female, Black, and Latinx students— are learning computer science (CS) by 2025. Through our work, students will be better prepared to utilize CS during their K-12 experience and after graduation.

EDUCATION



ECONOMY



EQUITY



PARTNERSHIP



EVALUATION



SCALE



The Opportunity

The skills that CS builds – critical thinking, problem-solving, collaboration, creativity – are essential components of student learning.

CS jobs are growing at twice the national average and every industry incorporates technology in their business. A robust and dynamic talent pipeline must meet these needs.

Prior to CS4All, female, Black, and Latinx students were underrepresented in AP CS classes.

Our Response

CS4All demonstrates how a public-private partnership can be effective, with NYC and the private sector sharing \$81M in initiative costs.

Lessons learned from internal and external analyses continuously drive improvements in implementation, teacher training, student tracking, and ultimately, student outcomes.

CS4All expands teacher knowledge through curriculum and PD, provides leadership opportunities, and helps school administrators plan for equitable growth of CS at their schools.

Leadership Messages



Richard A. Carranza
Chancellor, NYC
Department of Education

Our City's Computer Science for All (CS4All) initiative continues to be a cornerstone of our Equity and Excellence for All agenda. As an unprecedented \$81 million public-private partnership, CS4All launched in 2015 to ensure all NYC public school students receive high-quality CS instruction in elementary, middle, and high school by 2025. The urgency to provide equitable access to 21st century learning and skills to our students has never been greater—and that is the unwavering focus of CS4All.

This past year has been extraordinarily challenging for our school communities. Yet CS4All serves as a beaming example of the resilience, innovation, and bold partnership necessary to achieve system-wide change and set our young people up for success in a rapidly changing world.

With this CS4All Program Update, we are pleased to share an overview of CS4All, progress made in the 2019-20 school year, as well as some recent updates.

Despite the disruption caused by the pandemic, educators across all grade levels and subjects are raising their hand to bring CS4All to their schools—and I could not be prouder. To date, we've trained 2,025 teachers across more than 825 schools and have swiftly transformed our ability to deliver high-quality professional development virtually. As a result, in the 2019-20 school year alone, these incredible educators brought CS instruction to over 177,000 students. This is equity and excellence in action—and we won't stop until we reach all our students by 2025.

CS4All's progress is powered by our educators and sustained by a growing group of private donors working hand-in-hand with the City to bring this historic effort to scale. Put simply: it is a direct investment in our City's future, today.

Nowhere is the power of CS education clearer than in classrooms led by CS4All-trained teachers, whether students are learning in-person or remotely. You might see elementary school-aged students learning about loops and functions through dance, or high school students diligently preparing to compete in citywide hackathons. Throughout, they are learning to think computationally, to problem-solve creatively, and to collaborate with peers. When I see CS education taking root within our school communities, I know our City's future is bright. That is because it can create new college and career possibilities for our students, particularly for female, black, and Latinx students, who are typically underrepresented in technical fields.

On behalf of the New York City Department of Education and the Fund for Public Schools, we welcome your partnership and participation as we implement CS4All. Together, we can empower the next generation and create a more equitable city.

Richard A. Carranza
Chancellor, NYC Department of Education



Fred Wilson
Founder, NYC Foundation
for Computer Science

This year, the pandemic caused significant disruptions in the schools. In response, our CS4All team did what all good computer scientists do: collaborate, iterate, and debug.

First, we quickly pivoted to the virtual setting. Working with partners, we adapted our K12 CS education curricula into a new hybrid model that worked in a constantly changing environment.

And, we continued to train teachers. Many appreciated the convenience of remote sessions that didn't require travel. As demands on them increased, we recognized their need for greater flexibility. So, we increased the frequency of sessions to give them more opportunities to complete the required courses. We developed asynchronous modules so they could do the training on their own time. We set up "office hours" for support whenever they needed it.

Most of our CS teachers were already familiar with digital learning tools. Many helped fellow teachers navigate the virtual environment, demonstrating the value of our leadership training and the importance of a computer science culture within schools.

Our experiences in remote learning also revealed clear inequities for students who didn't have reliable or robust internet access. They live in the very communities that are a priority for CS4All -- reinforcing my commitment to our goal of making sure every NYC student has the opportunity to study computer science.

Our private sector donors, who are essential to our success, were understanding and loyal. The sponsors of the CS Fair even worked patiently with us for months as we transitioned from an in-person spring event to a fully virtual one in the fall. I am very grateful to all of our supporters.

This year also proved how incredible our teachers are. They adapted and delivered during an extremely challenging time. And they did it with optimism and compassion. They have my deepest thanks.

Fred Wilson
Founder, CSNYC/Partner, USV

Impact to Date

Key Metrics

Progress to Goal:



**2,025 CS4All TEACHERS
TRAINED TO DATE**

CS4All will train more than 5,000 teachers.

To achieve scale, the DOE aims to train 400-500 teachers who are new to CS each year.



825+ SCHOOLS TO DATE

CS4All will reach more than 1,500 schools.

Teachers trained to date represent more than 55% of our target schools.

Student Reach:



**177,000 STUDENTS
IN YEAR 5 ALONE**

All NYC public school students will have access to CS education by 2025.

In the 2019-20 school year, 177,000 students received CS education, an 8% increase since the 2018-19 school year.



**5,573 AP CS EXAM
TAKERS IN 2019**

The number of students who took an AP CS exam in 2019 was 5,573 compared to only 1,137 students in 2016.

NYC had a higher percentage of female, black, and Hispanic students take the AP CSP exam in 2019 than did nationwide:

*42.2% were female, compared to 29.4% nationwide

*15.6% were Black, compared to 5.7% nationwide

*19.6% were Hispanic, compared to 16.6% nationwide

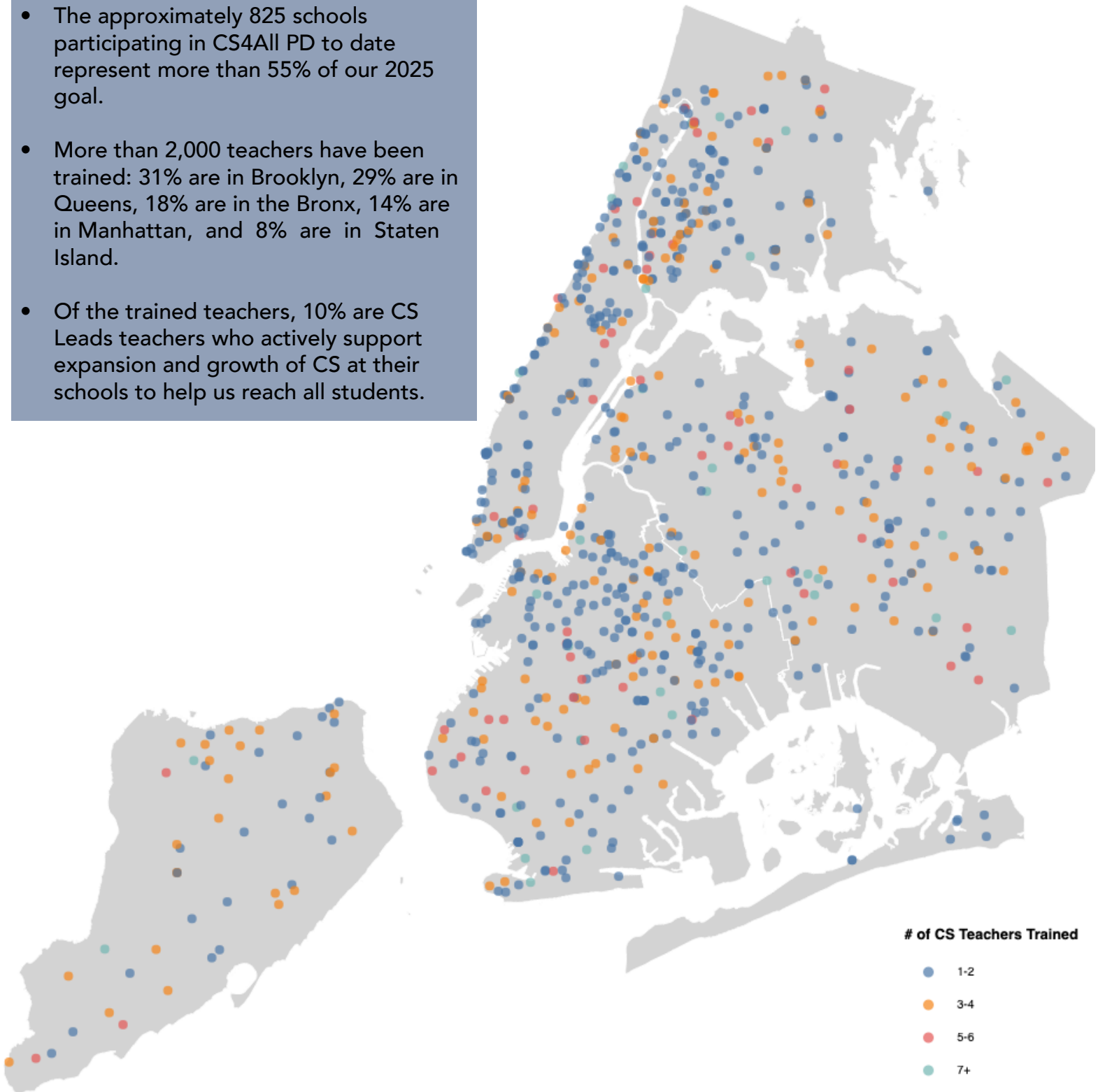
*This growth is partially due to the introduction of the AP CS Principles (AP CSP) exam in 2017.

Impact to Date

Initiative Reach

Schools with CS4All-trained teachers

- The approximately 825 schools participating in CS4All PD to date represent more than 55% of our 2025 goal.
- More than 2,000 teachers have been trained: 31% are in Brooklyn, 29% are in Queens, 18% are in the Bronx, 14% are in Manhattan, and 8% are in Staten Island.
- Of the trained teachers, 10% are CS Leads teachers who actively support expansion and growth of CS at their schools to help us reach all students.



Program Highlights

Training Avenues

CS4All works with school administrators to build and scale CS programs that allow all students to experience CS learning. Teachers and schools are offered a menu of implementation options and corresponding professional development opportunities, tailored to their unique needs. Curriculum and professional development are provided by the DOE CS Education team and partner organizations.

CS Institute Each year, CS4All kicks off an intensive two-week professional development (PD) training for elementary, middle and high school teachers.

Courses

In Courses, CS4All provides teachers with technical, curricular, pedagogy, and implementation support through PD.

For example, in the AP Computer Science Principles PD, teachers learn both the curriculum for preparing to take the AP CS Principles exam and best practices in CS pedagogy to guide their approach in the classroom.

Sequences

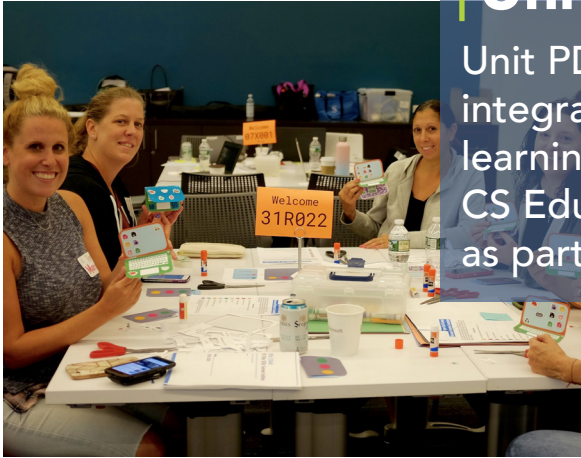
Sequences PD equips teachers to provide CS instruction at each grade level. CS4All's sequence programs are tailored for educators who teach younger students (elementary level) and older students (middle and high school levels).

For example, schools in Software Engineering Program Jr. receive training for teacher teams across multiple grade bands, providing CS learning to young learners as they advance through elementary school.



Program Highlights

Training Avenues (cont.)



Units

Unit PD offers teachers the opportunity to learn how to integrate units of CS into other subject areas. Teachers learning a unit of CS receive curriculum and support from CS Education-Managers and real-time feedback on lessons as part of in-school coaching visits.

For example, an algebra teacher attending Unit PD could learn how to teach students how to create responsive robots to help them learn both algebra and CS.



School-wide CS Capacity

School leaders learn CS concepts, perspectives, and practices and receive guidance on how to create a plan for implementing CS school-wide.

Training Teacher Leaders:

CS Leads - Returning teachers trained to build CS school culture through activities such as events or trainings that encourage CS exposure, access, and belonging for fellow educators and students.

Teacher Trainers - Returning teachers trained to facilitate CS PD and share their experiences for their fellow teachers.

Program Highlights

Equity Focus

As the nation's largest district-wide implementation of computer science education, CS4All is designed to ensure all NYC public school students have exposure and access to high quality computer science experiences -- with an emphasis on reaching female, Black, and Latinx students that are underrepresented in the technology sector. CS4All is implementing a multi-pronged approach to ensuring all teachers have the training and resources to deliver equitable computer science education.

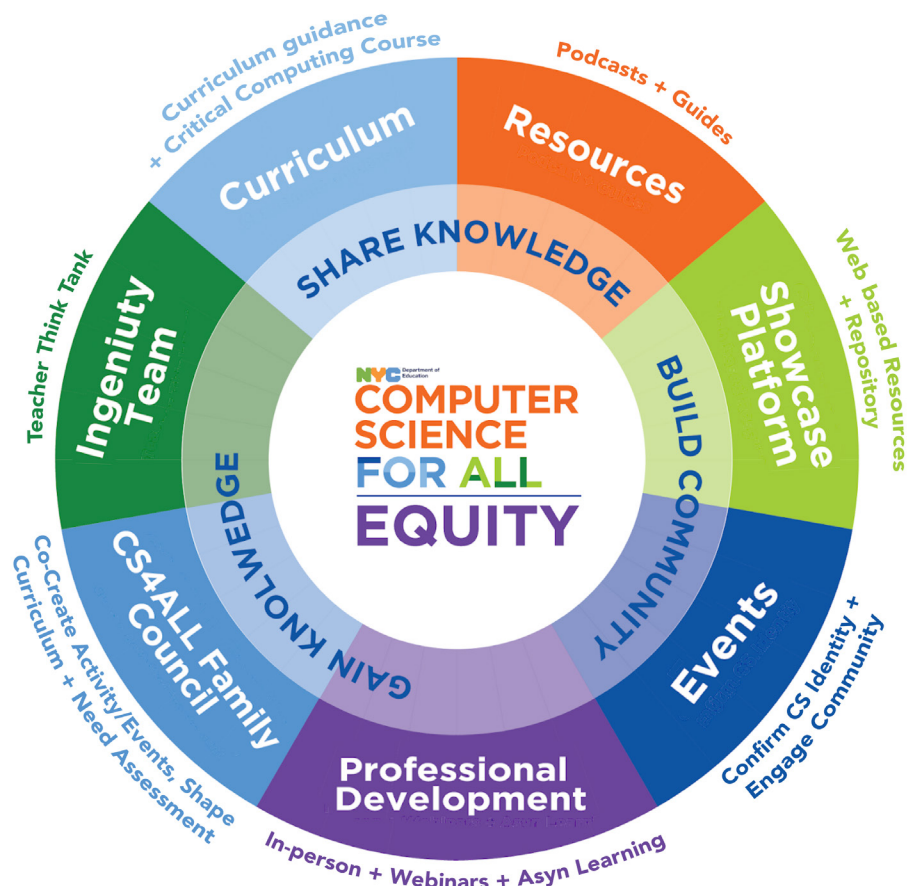
Core elements of our CS4All Equity strategy include:

Professional Development for Educators: A Culturally Responsive-Sustaining Education (CR-SE) framework is fully embedded in all CS4All professional development pathways as well as a new professional development series "Exploring Equity in Computer Science."

Curriculum Guidance and Resources: A new [CS4All Equity website](#) hosts a range of resources for computer science educators to support them in exploring, developing and refining their practice of equitable CS education, including videos, podcasts, and classroom tools, activities, and lesson plans.

Ingenuity Team: As a teacher "think tank," - this team develops new curriculum and provides critical feedback and direction on CS4All program design, to ensure equitable practices are incorporated at every step of implementation.

Equity Events: A series of special events increase belonging within the computer science field by featuring people of color and women who are leading the way, and engaging them in critical conversations about CS education, policies, and practices.



Program Highlights

Student Engagement

Student engagement opportunities are dynamic, interactive ways to link classroom-based instruction to real-world context through hackathons, internships, and other community engagement events.



Citywide Hack League

Students from The Young Women's Leadership School of Astoria present CS solutions to community problems.



Family & Community Event

Staten Island parents work on an unplugged CS activity during the borough's family and community event in 2019.



AP CS Principles Event

Students engaging with CS professionals while also completing the AP CS exam performance task.



Day of CS enrichment during April 2020 spring break

Students citywide had the opportunity to participate in a CS activity while learning remotely.

Program Highlights

Teacher Voices



Ross Berman, M.S. 217 computer science teacher

"Even in remote learning, we have been able to expand our computer science program. More teachers were trained in Scratch and are now teaching computer science or incorporating it into their subject areas. Students often talk about how they love to use Scratch because it allows them to be creative and it takes their mind off of what is going on in the world."



Donald Saint-Germain, CS/ELA teacher at Bronx Collaborative High School

"Coordinating the implementation of CS while remote has been difficult, but I am working to communicate the valuable experience that will benefit our students. Following the implementation of a hack-a-thon and our first CS course at our school in the spring, we hope our community will reap the benefits of a CS education in our school."



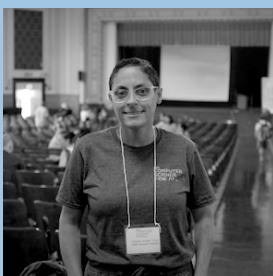
Brittany Concannon, teacher at Queens High School of Teaching

"The CS Institute gave me the foundation to feel confident and ready to pioneer a new course at the high school where I teach, and as a new-to-CS teacher last year, I was learning while I taught. Few things help you to better empathize and connect with students than being a learner yourself. From the get-go, on the first day of school, I said, 'we're both going to explore the frustrations, the joy of CS and make mistakes together -- because that's just how you learn.'"



Rich Parker, AP Computer Science Principles teacher at Benjamin Banneker Academy

"Seeing that now, more than ever, more New York City students of color and young women are taking and passing the AP exam is beyond inspiring. This fact emboldens me to rise to the challenge and to fill my students with energy and motivation as soon as I see them. The world is changing and whether or not students realize it yet, they will need to innovate their way through future challenges. Throughout their life they will need to reinvent themselves and adapt to or create new technologies we can't even conceive of yet. Our role as educators in CS is to prepare them to lead us."



Yokasta Evans-Lora, teacher at Brooklyn Arbor Elementary

"All students must learn CS, especially black, Latinx, and female students traditionally left out. It is our responsibility to ensure they are the future leaders of the workforce -- that's our why. All students, through CS, should be able to be creative, make mistakes, iterate, and feel empowered as they develop 21st century skills -- that's the what. So then, how this comes together is by teachers - in tandem with understanding CS concepts, strategies, and curriculum - sharpening their skills to incorporate who their students are as assets within all aspects of their learning."

Program Highlights

Industry Engagement

AP CSP Create Events

Hosting students

Companies host high school students as they develop projects required for the AP Computer Science Principles exam. After working on their projects, students engage with a panel of employees who share their experiences, challenges, and opportunities. These events help students prepare for exams, while giving them exposure to professionals in the technology sector.



Pathfinders

Student internships

Pathfinders is a semester-long internship program for high school CS students. Students are vetted and then matched at a variety of companies and organizations. Interns help with a variety of tasks including market research, basic web development, IT support, and general office support. Interns log at least 60 hours at their offices and are supervised by designated employees who provide mentoring and guidance.



CS Education Week

Volunteering with schools

Every December, volunteers from tech and donor companies engage with schools as part of CS Education Week, an annual, global celebration that highlights the importance of CS. Volunteers talk about how their knowledge of CS has led to professional success and also judge hackathons, speak on career panels, and assist teachers with their planned CS activities.



Computer Science Fair

Discovering Opportunities

The annual CS Fair inspires students about career and educational opportunities that result from studying CS. The Fair showcases the employees, products and services available at tech companies and introduces students to CS-related programs at colleges and universities. This year, the Fair transitioned to a fully virtual model.



Recent Developments

COVID-19 and the Pivot to Remote PD

Under Chancellor Richard A. Carranza's leadership, the nation's largest school system has transformed in a matter of months, persisting through complex challenges caused by the pandemic. This year, CS4All reimagined its program design and curriculum for the blended and remote learning environment to ensure high-quality learning experiences for both teachers and students. The skills and competencies that computer science education builds are needed now more than ever.

Program adjustments for the 2020-2021 school year included:

- Transitioned to fully remote professional learning and student engagement events
- Updated all Units, Sequence, and Courses curricula for the remote and blended learning environment
- Extended the schedule of professional learning throughout the school year, while reducing the length of individual professional learning sessions due to the engagement limitations of video conferencing (e.g. "Zoom fatigue")
- Adapted the adult learning model to include both synchronous and asynchronous components to offer additional flexibility to account for different schools' schedules
- Provided additional supports for teachers throughout the year
- Maximized flexibility for teachers and schools implementing CS4All



Thank You

CS4All is very grateful for the generosity and commitment of all our donors. To date, a range of private and corporate foundations have supported the initiative in addition to the significant contributions from the City. These investments are helping to create a diverse pipeline of prepared and skilled future employees.

Major Supporters

Founders Committee

\$2,500,000 +
Solomon Wilson Family Foundation
Robin Hood
Math for America (MfA)
Robin Hood Learning + Technology Fund

The CS4All Founders Committee is an advisory group that provides general advice and oversight with respect to the overall private budget, as well as feedback on program activities and the independent evaluation.

\$1,000,000 +
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\$25,000 +
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Liz Lange and David Shapiro
Amanda and Jonathan Eilian
Kevin Ryan

CS4All, the nation's largest CS education initiative, is an \$81 million initiative over 10 years with funds coming equally from the public and private sectors. An investment in CS4All helps build a sustained system that will ensure a robust pipeline of graduates to match the skills and competencies that local and global companies seek.

COMPUTER SCIENCE FOR ALL

Computer Science for All is a public-private partnership to bring 21st-century computer science instruction to every NYC public school. The CS Education team within the NYC Department of Education's Office of Postsecondary Readiness implements this important Equity and Excellence for All initiative.

@CSforAllNYC

