



Expanding Computer Science Education to All Students

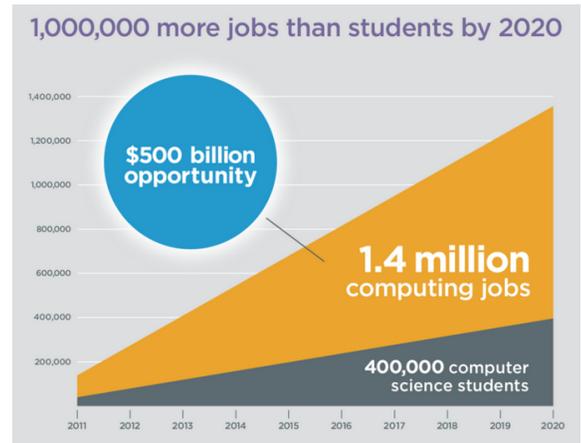


from Pre-Kindergarten to 12th Grade in SFUSD

IMPORTANCE OF COMPUTER SCIENCE EDUCATION

Computer science (CS) is an increasingly important discipline, as computing has become ubiquitous in our everyday work and continues to infiltrate the job market. In the coming years, there will be far more computing jobs than there are U.S. computer science graduates to fill those jobs. Even though the majority of students today will not become programmers or computer scientists, the knowledge and skills gained in computer science education are nevertheless critical to understanding the science underlying the technologies essential to today's world. In addition, students learn how to work cooperatively; engage in interdisciplinary, innovative thinking; and persist in solving complex problems.

sources: US Bureau of Labor Statistics & Code.org



STATE OF CS EDUCATION IN SFUSD

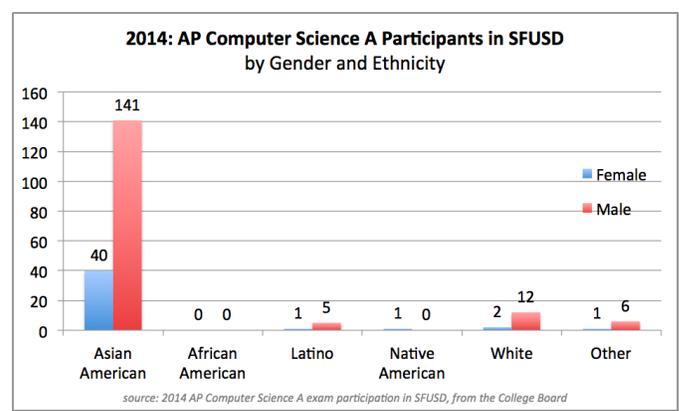
Currently, only 5% of our high school students are enrolled in a computer science course, and only half of our high schools offer at least one course. Advanced Placement (AP) computer science courses exist at five schools, but participation is extremely limited: of the nearly 10,000 high school students who took AP exams in 2014, only 2.2% (209 total) took the AP Computer Science A exam. Computer science education is even less prevalent in other grade levels, though some students are engaging through informal opportunities outside of the school day.

Elementary Schools	Middle Schools	High Schools	Outside of School
little to no ongoing instruction	2 schools have electives (2 total sections) 10 schools are piloting Code.org's curriculum in elective courses	9 schools offer 28 total sections: <ul style="list-style-type: none"> • 5 have TEALS • 5 offer AP CS • 4 have CTE academies 835 total students enrolled in CS courses (5% of all high school students)	Afterschool and summer programs at some middle and high schools include: <ul style="list-style-type: none"> • FIRST Robotics League • Girls Who Code • Black Girls Code • Mission Bit • Square Code Camp • Technovation

DISPARITIES IN ACCESSING CS EDUCATION

Expanding computer science access is paramount to improving equity among those involved in computing. In 2013, African Americans and Latinos comprised only 14% of all computer programmers, while women comprised only 23%. The racial disparity is even greater at some tech giants like Google, Twitter, Facebook, Yahoo!, and LinkedIn, where only 5-6% of the workers are people of color.

Sadly, similar statistics hold true with those students pursuing computer science in high school and college. Of the 209 SFUSD students who took the AP Computer Science exam last spring, only 22% were female and only 3% were African American, Latino, or Native American.



OUR COMMITMENT

Based on the importance of developing knowledge and skills in all students and the need to break current trends in order to give more equitable access to computer science education, we must begin teaching children much younger and ensure that we reach every student.

With this in mind, SFUSD is excited to make a commitment that is unprecedented among other large, urban school districts: to expand computer science education to all schools and all students, beginning in pre-kindergarten and extending through 12th grade.

This commitment is grounded in the following guiding principles:

- Understanding how computers work and how to creatively use this knowledge to solve problems will be increasingly important for all students, as they prepare for college and their future careers.
- All students are capable of making sense of computer science in ways that are creative, interactive, and relevant.
- All students, from Pre-K to 12, deserve access to rigorous and culturally meaningful computer science education.
- Students' access to and achievement in computer science must not be predictable on the basis of race, ethnicity, gender, socioeconomic status, language, religion, sexual orientation, cultural affiliation, or special needs.
- The field of computer science will continue to rapidly evolve in sometimes unpredictable ways, and as such, our plan for teaching computer science will also need the flexibility to continuously adapt.

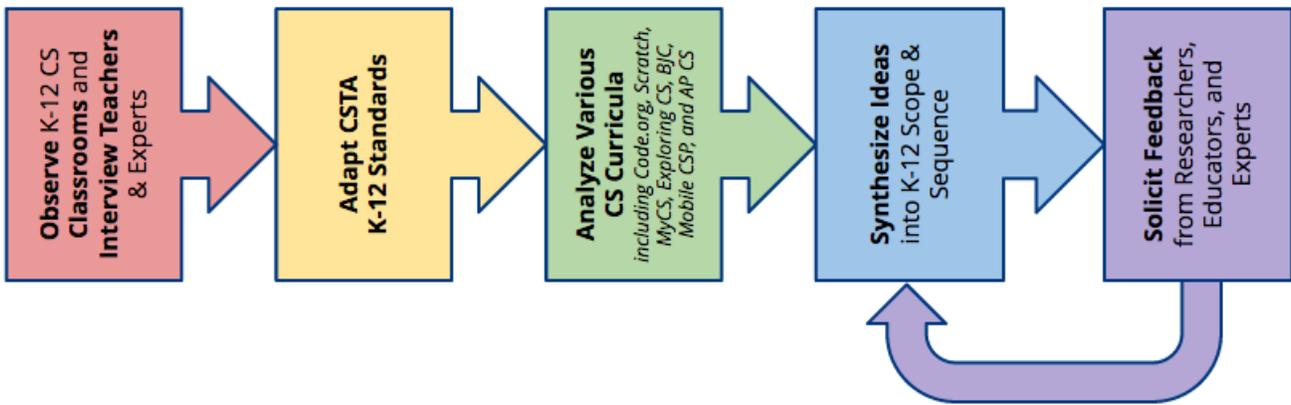
GOALS OF THE INITIATIVE

In order to realize our ambitious commitment, we have set the following goals:

1. Understand the current state of computer science education in the district.
2. Craft a coherent, PK to 12 scope and sequence of essential knowledge and skills.
3. Write a position paper to submit to the Board of Education for review.
4. Develop a policy and actionable plan with an equity mindset: *all students*, not just all schools.

DEVELOPING A COHERENT, PK-12 SCOPE AND SEQUENCE

There has been little academic research in computer science education, and few schools, districts, and companies have created cohesive programs. Therefore, we have developed a preliminary scope and sequence of essential knowledge and skills for each grade level using the following process:



PROGRESS AND CONCLUSION

District students, teachers, and leaders agree that expanding computer science education is essential. This fall, we have: analyzed current district course offerings, enrollment, and achievement data; surveyed teachers and observed classrooms inside and outside of the district; assembled an advisory panel of academics, industry professionals, and educators; researched existing curricula and instructional materials; and drafted a PK-12 scope and sequence. We must now work quickly to leverage successful existing programs and develop a coherent and comprehensive program that will impact all students from grades PK to 12. In the coming months we seek to: solicit additional feedback to critique our scope and sequence; develop a policy with various implementation models; select a model and craft an actionable plan; and present a final position paper to the Board of Education. With the Board's support, we plan to pilot in 2015-2016 and execute a fuller implementation in 2016-2017.