CSforCA

COMPUTER SCIENCE EDUCATION DATA: CENTERING EQUITY TO MEASURE WHAT MATTERS

Computer science (CS) education has the power to shape the futures of California's students, our economy, as well as our society at large.

However, systemic and historic inequities embedded within our education system impact the patterns of who participates in computer science education and in turn, impact the realization of a diverse and inclusive innovation economy. In order to ensure equitable CS education, an intentional focus on equity must be embedded in data collection, analysis, and decision-making and inform the work of educators, district administrators, and policymakers.

DATA SPOTLIGHT:

Overall trends in course availability indicate that there has been steady growth in the number of high schools offering CS courses, with the number of schools offering at least one CS course **increasing by 61%** between 2014 and 2017.

However, a data dive with an equity lens demonstrates the disparities affecting low-income students and students of color, and their access to CS courses.

- Black, Latinx, and Native American/Alaskan Native students represent almost **60%** of California's high school population, and **50%** of students enrolled in introductory CS courses, but just **16%** of students enrolled in AP CS A.[1]
- The recruitment and retention of qualified teachers, especially teachers of color, is **more difficult in low-income and rural areas**.[2]
- Schools serving low-income areas are **4x less** likely to offer AP CS courses, while schools serving rural areas are **7x less** likely to do so.[3]

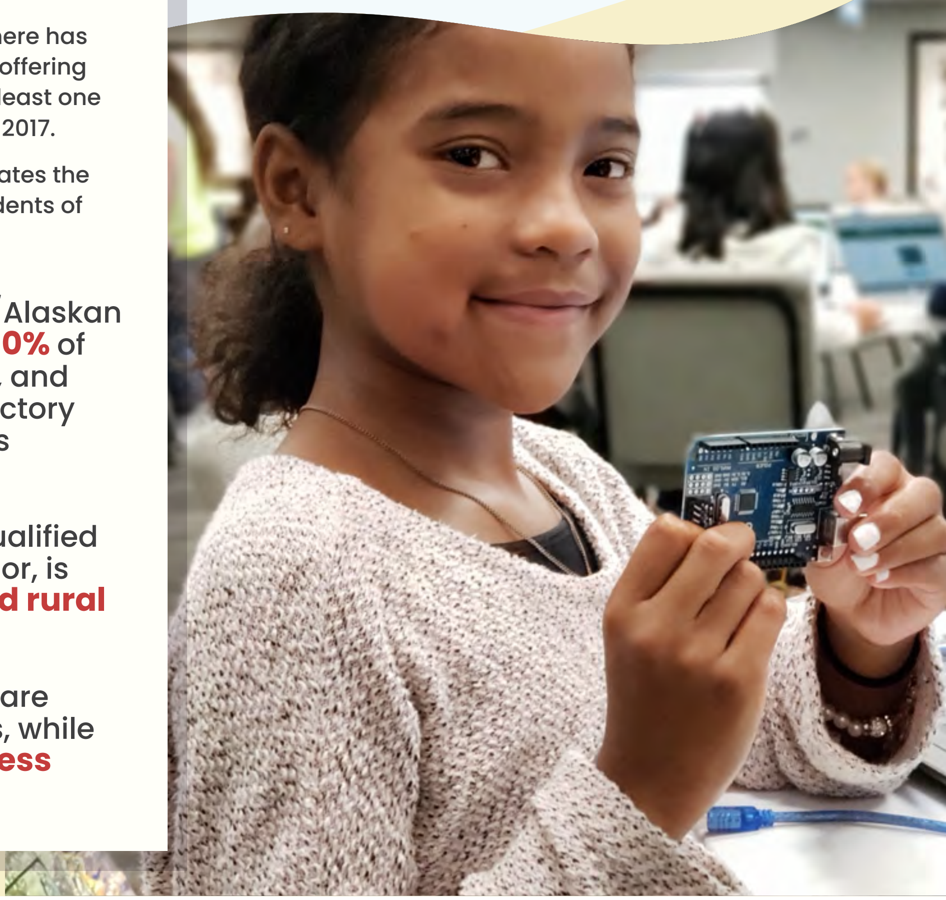


Photo Courtesy of Riverside Unified School District

[1] Scott, Allison, et al. "Computer Science in California Schools: An Analysis of Access, Enrollment and Equity." Kapor Center, 17 June 2019, https://www.kaporcenter.org/wp-content/uploads/2019/06/Computer-Science-in-California-Schools.pdf.

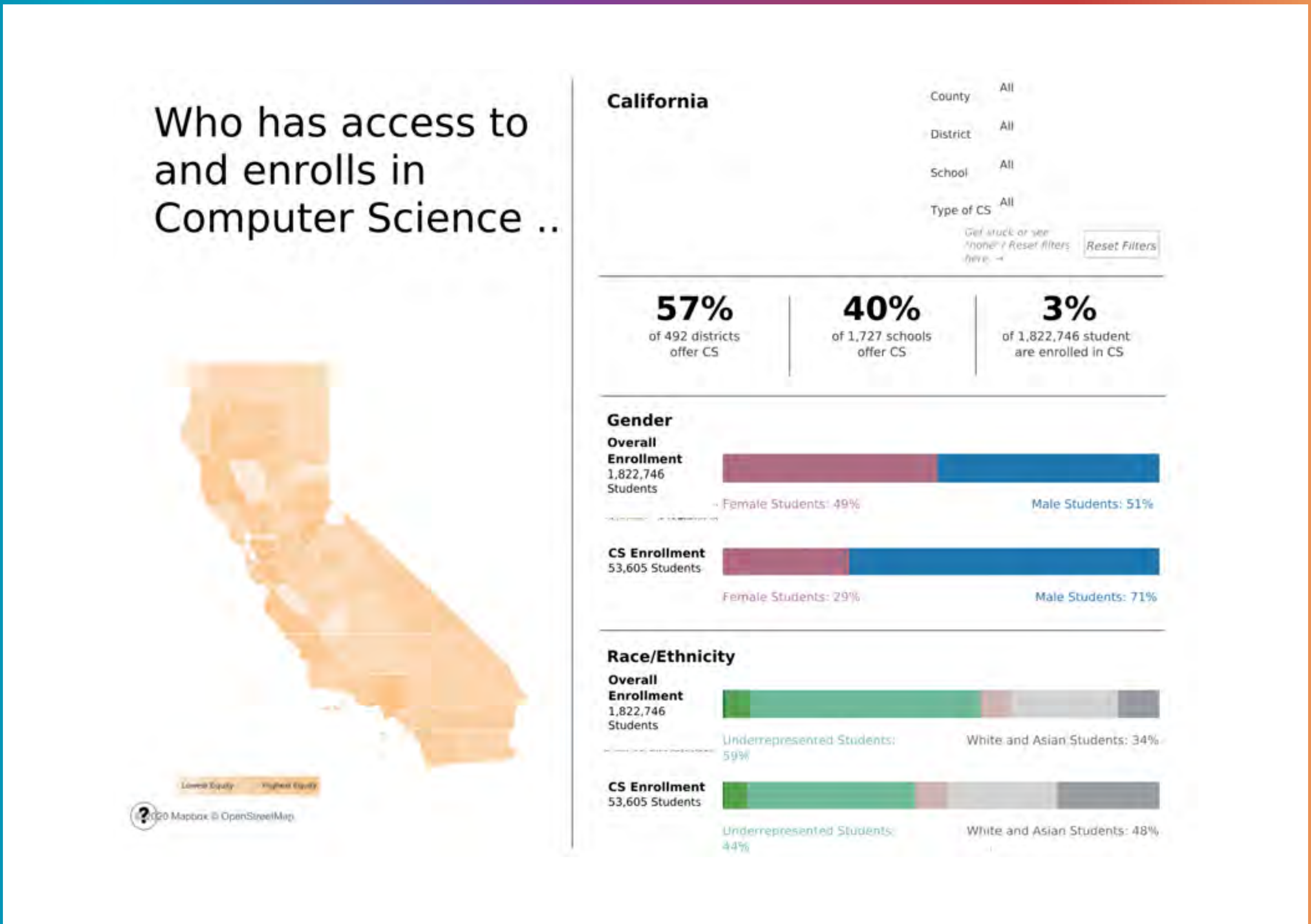
[2] Education Trust-West, "The STEM teacher drought: Cracks and disparities in California's math and science teacher pipeline," (Oakland, CA, 2015). https://west.edtrust.org/wp-content/uploads/2015/09/ETW-Sept-2015-STEM-Drought-Final.pdf

[3] Scott, Allison, et al. "Computer Science in California Schools: An Analysis of Access, Enrollment and Equity." Kapor Center, 17 June 2019, https://www.kaporcenter.org/wp-content/uploads/2019/06/Computer-Science-in-California-Schools.pdf.

UNDERSTANDING THE EQUITY GAPS IN YOUR SCHOOL COMMUNITY

Data on numbers of CS courses offered or numbers of students enrolled provide broad trends, but often hide important equity gaps. Knowing which schools and districts provide CS instruction and the demographics of students enrolled in CS courses helps educators, administrators, policymakers, and advocates prioritize actions to ensure all students have equitable access to quality CS instruction.

To track CS accessibility and equity in your school community, use our **data tool** where you can enter your county, school district, or school to see what types of CS courses are offered and which students are enrolled in them. You can also view your county, district, or school's Equity Grade, a measurement of the extent to which underrepresented students of color and girls are proportionately represented in computer science enrollment.



Source: https://csforca.org/the-data

Approaches to Equitable CS Data Collection

While our existing data gives us a wealth of information for immediate action, it is important to address limitations of data to draw accurate insights for real change.

- **Collect disaggregated data.**
  Understanding the experiences of different groups of students requires disaggregating data by gender, race, socioeconomic status, etc., allowing for the identification of inequities. When analyzing data that cannot be disaggregated (e.g., Asian subgroups, including East, South Asian, and Pacific Islander individuals, all have different experiences and outcomes, but can often not be disaggregated from the broader "Asian" category), it is important to flag this caveat.

- **Approach data through an inclusive and intersectional lens.**
  While race, gender, and socioeconomic status remain the focus of broadening participation efforts, it is crucial to explore the ways identities intersect. Girls of color face the double-bind of two intersecting identities of race and gender. Additional identities can include: sexual orientation, age, (dis)ability, religion, immigration status, schooling background, parenting/caregiving status, language, and parent or guardian's veteran status, to name a few.

- **Analyze data through an asset-based frame.**
  When we focus on a student's limitations or only consider one portion of a student's background, we limit our ability to see their full potential. We can build upon students' existing strengths and their respective communities while considering the complete picture that shapes a student's educational experience.

- **Gather data on all levels of CS cources and acknowledge the limitations of AP data.**
  We often rely on AP data from the College Board as one indicator for access and participation in CS coursework. While AP data is uniformly collected, publicly reported, and used as a benchmark in national comparisons, it has its limitations. In addition to limited access to AP coursework, many students lack the scaffolding provided in an introductory level course, and access to tutors and test preparation. To provide an accurate picture of CS in California, we need data on integrated K-6 CS courses, standalone 6-12 grade level CS courses, AP/IB, and CTE courses. It's worth exploring disparities across different levels of courses.

- **Clarify the types of computer science cources you include in your analysis.**
  Not all computer science courses are created equally. Courses can vary widely in rigor and focus. Computing is a broad term defined by the Association for Computing Machinery as the "study of computers and algorithmic processes, including their principles, their hardware and software designs, their implementation, and their impact on society." Ensure you have a rigorous definition, methodology, and procedures for identifying which courses "count" as CS.

- **Gather data on classroom learning experiences.**
  Although access to CS courses is an essential indicator of equitable opportunities, it is also important to consider the differential classroom experiences of students that lead to outcomes. For example, do all students feel welcome and engaged in the learning process? Are instructional material aligned to students' level of understanding and relevant to their lived experiences?

Photo Courtesy of Los Angeles Unified School District

EVERY STUDENT DESERVES AN EQUITABLE CS EDUCATION

Accurate and holistic data can help us identify opportunity gaps for different groups of students who are systematically denied access to educational resources, support, and experiences. Research and data help us understand students' unique barriers and complex challenges. Data ultimately enables us to take actionable steps that ensure all students can obtain a high-quality, equitable CS education.

More to the story...

Monitoring access and equity in CS with quantitative data help us hold the system accountable for unequal patterns in access and opportunity. It is also essential to augment quantitative data with qualitative data, such as interviews and focus groups, that capture stories of excellence, growth, engagement, belonging, identity, and agency of students of color and the teachers that support them. Visit **www.CSforCA.org** for videos and other examples that elevate student and teacher voices in understanding the significance of CS education and its impact on broadening participation.

Defining Key Terms

When analyzing and interpreting CS education data, it's crucial to have a shared understanding of the terminology and definitions frequently used. Below are definitions and considerations used by CSforCA when examining data:

- **Underrepresented Students**:
  We define "underrepresented" student populations from racial/ethnic or gender groups which are underrepresented in computing education (and across the tech ecosystem), relative to their percentage in the overall state population. In computer science education, underrepresented students specifically include: Black, Latinx, Native American/Alaskan Native/Native Hawaiian students, and girls from all backgrounds, with Black, Latinx, and Native American/Alaskan Native/Native Hawaiian students most underrepresented.[4]

- **Low-Income Schools vs. High-Income Schools**:
  We classify the income levels of school communities by assessing the percentage of students who qualify for Free/Reduced-Priced Lunch. We use the definition of Low-Income as schools where more than 75% of the student population qualify for Free/Reduced-Priced Lunch while High-Income Schools are schools in which less than 25% of the student population qualify as such.[5] Another option is to use the federal designation for Title 1 schools (schools with >40% of students eligible for Free/Reduced-Price Lunch.

- **Urban vs. Rural**:
  We classified the urbanicity of schools using the Census definition, where counties with less than 50% of the population living in rural areas are classified as urban; counties with 50 to 100% percent of the population living in rural areas are classified as rural.

- **Equity Gaps**:
  We examine equity gaps by quantifying the disparities between the representation of demographic groups participating in CS courses (by race/ethnicity, gender, socioeconomic status, and geography), relative to the percentage of that group in the school/district/county.

- **Achievement Gap vs. Opportunity Gap**:
  Because "achievement gap data" is often attached to a deficit-based view of students and longstanding inequities in education, we choose to frame inequality in CS as an "opportunity gap" where limited resources and access to courses limit students opportunities to learn rigorous CS.

[4] McAlear, F., Scott, A., Scott, K. & Weiss, S. (2018). Data Brief: Women of Color in Computing, https://www.wocincomputing.org/wp-content/uploads/2018/08/WOCinComputingDataBrief.pdf?inf_contact_key=978a01726818e8eebbce41a601ac36133ef35705cfbd14d6ba7ede22f4d42d7d.

[5] Scott, Allison, et al. "Computer Science in California Schools: An Analysis of Access, Enrollment and Equity." Kapor Center, 17 June 2019, https://www.kaporcenter.org/wp-content/uploads/2019/06/Computer-Science-in-California-Schools.pdf.