K-12 Computer Science Education

California

This report summarizes the status of computer science (CS) education from a 2014 survey of 9,693 U.S. K-12 school principals. Topics include perceptions, opportunities and participation, as well as support and infrastructure.

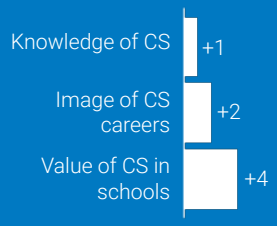
These data are from a multi-year Google-Gallup study of U.S. students, parents, teachers, principals, and superintendents.

g.co/cseduresearch

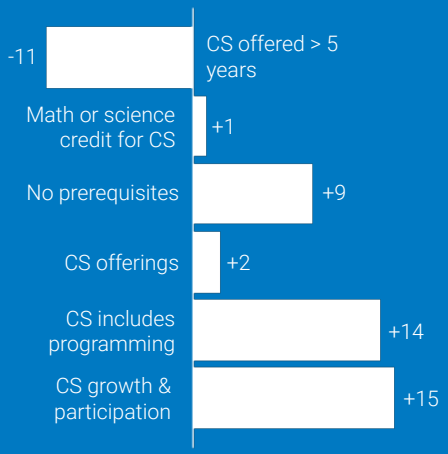
Compared to the U.S. average, California principals more likely value CS learning. However, CA schools are less likely to offer CS and AP CS classes but more likely to have afterschool CS programs. CS learning opportunities also more likely include programming. California principals report growing participation and demand among students and parents.

Values below indicate percentage point difference from the U.S. average. See back for full data tables.

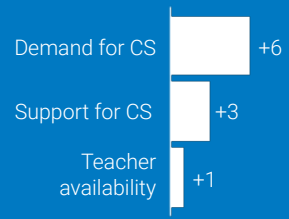
Knowledge & Perceptions



Opportunities & Participation



School Infrastructure



Background

Broadening equitable student access to computer science (CS) is critical to our future, not only because of the increasing demand created by computing-related jobs but also because it develops critical thinking to solve complex problems, creativity to foster new ideas, and skills to drive innovation. To inform progress in ensuring *Computer Science for All*, this report provides a status of CS education and recommendations for California.

Findings

Results from the 2014-15 Google-Gallup study indicate that improvement is needed for California schools to implement CS education for all students.

- **Most confuse CS as basic computer literacy**. In California, only 34% of principals surveyed correctly identified computer literacy activities as *not* computer science (U.S. average 33%).
- **CS offerings are limited**, with 33% of California principals reporting offering CS classes with programming and coding (U.S. average 26%).
- **CS offerings often appeal to and serve a subset of students**. California principals report CS students are most commonly White and, when compared to the U.S. average, are more often Hispanic or Asian but less often Black.

To help prepare schools for CS education, the study also identified challenges to providing CS education for all students in California.

- **Parents' demand for CS is not heard**; 91% of U.S. parents want their child to learn CS, whereas only 9% of California principals believed there was high demand for CS (U.S. average 7%).
- **Principals perceive low school board and staff support for CS** in California at 40% (U.S. average 37%).
- **Lack of teachers trained in CS** (55%), **not enough budget for a CS teacher** (53%), and **lack of necessary computer software** (46%) were reported by California principals as the greatest barriers to offering CS for their schools.

Recommendations

- **Differentiate between computer literacy and computer science** to ensure students not only learn to use technology, but learn to create technologies.
- **Expand CS offerings** by connecting with communities, legislators, and organizations advocating for CS.
- **Promote diverse participation** by integrating equity practices into CS pedagogy, encouraging participation through various pathways, and diversifying portrayals of CS to build confidence and identities.
- **Increase qualified CS teachers** through incentives and support of quality teacher preparation and certification.
- **Prioritize funding** to meet the demand for CS.
- **Broaden student access to various computer technologies** through a variety of paths in and out of school.

*See **g.co/cseduresearch** for recommended resources.*

Google

GALLUP

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Data Tables

The descriptive data tables below show responses by 709 California K-12 principals compared to the full sample of 9,693 U.S. K-12 principals, surveyed Nov.-Dec. 2014; sample size may vary by question. Percentage point differences from the U.S. for each category were calculated from the percentages bolded below. Full methodology is at **g.co/cseduresearch**.

Knowledge & Perceptions	CA	US
Knowledge of CS (% no to both)	**34**	**33**
Which of the following activities do you consider part of CS? (% no)		
...Creating documents or presentations on the computer	37	35
...Searching the Internet	42	44
Image of CS careers (average % positive)	**89**	**87**
People who do CS make things that help improve lives. (% agree)	83	82
There are a lot of good jobs available in the U.S. for people who know CS. (% agree)	92	90
CS can be used in a lot of different types of jobs. (% agree)	91	89
Value of CS in schools (average % positive)	**76**	**72**
It is a good idea to try to incorporate CS education into other subjects at school. (% agree)	74	70
Most students should be required to take a computer science course. (% agree)	65	59
Do you think offering opportunities to learn CS is more important, just as important, or less important to a student's future success than (% just as/more important)		
...required courses like math, science, history and English?	72	68
...other elective courses like art, music, and foreign languages?	92	91

Opportunities & Participation	CA	US
CS offered > 5 years: How long has your school offered opportunities to learn computer science? (% greater than 5 years)	**39**	**49**
Math or science credit for CS (% positive to either)	**14**	**13**
Which of the following describe how credit is given for computer science courses offered at your school? Select all that apply. (%)		
...A math requirement	10	10
...A science requirement	8	8
No prerequisites: Do CS classes offered in your school have prerequisites? (% no)	**82**	**73**
CS offerings (average % positive)	**55**	**53**
About how many different types of CS courses are available in your school this year? (% 1+)	53	54
For each of the CS classes available this year, how many are (% 1+)		
...Introductory level	95	95
...AP courses	19	21
...Other	43	44
As far as you know, is CS taught as part of other classes at your school? (% yes)	48	43
How many school clubs or after-school activities that expose students to CS are at your school? (% 1+)	72	62
CS includes programming: Do the computer science opportunities offered in your school include any of the following elements? ...Computer programming and coding (%)	**67**	**53**

Opportunities & Participation	CA	US
CS growth & participation (average % positive)	**61**	**46**
[Of those offering CS] In the last 3 years, has CS participation increased, stayed about the same, or decreased? (% increased)	68	51
In the next 3 years, will the number of opportunities to learn CS in your school increase, stay the same, or decrease? (% increase)	63	49
Students who learn CS: How often are students who learn CS at your school (% usually/sometimes)		
...Girls	26 /57	27 /54
...White/Caucasian	42 /48	60 /32
...Black/African-American	15 /47	21 /43
...Hispanic/Latino	25 /50	21 /44
...Asian	36 /48	26 /41

School Infrastructure	CA	US
Demand for CS (average % positive)	**33**	**27**
Demand for CS education among parents in your school is (%)		
...High	9	7
...Increasing	48	36
Demand for CS education among students in your school is (%)		
...High	17	14
...Increasing	58	49
Support for CS (average % positive)	**40**	**37**
CS education is currently a top priority for my school. (% agree)	28	24
My school board believes CS education is important to offer in our schools. (% agree)	45	43
The majority of teachers and counselors in my school think it is important to offer CS. (% agree)	48	45
Teacher availability (average % positive)	**49**	**48**
I could easily identify a staff member with the skills and knowledge to teach a CS course. (% agree)	58	56
Would you have to hire a new teacher to teach CS or is there teacher at your school could teach CS? (% there is a teacher)	41	40
Barriers		
As far as you know, why doesn't your school offer any ways to learn computer science? Select all that apply. (%)		
...There are no teachers available at my school with the necessary skills to teach computer science.	55	42
...There is not enough money to train or hire a teacher.	53	44
...We do not have the necessary computer software.	46	32
What was the largest barrier your school had to overcome to offer CS? (%)		
...There were no teachers available at my school with the necessary skills to teach computer science.	21	15