

Support K-12 Computer Science Education in Colorado

Computer science drives job growth and innovation throughout our economy and society. Computing occupations are the **number 1 source of all new wages in the U.S.** and make up over half of all projected new jobs in STEM fields, making Computer Science one of the most in-demand college degrees. And computing is used all around us and in virtually every field. It's foundational knowledge that all students need. But computer science is marginalized throughout education. Only 53% of U.S. high schools teach any computer science courses and only 4% of bachelor's degrees are in Computer Science. We need to improve access for all students, including groups who have traditionally been underrepresented.



In Colorado, there are currently 11,923 open computing jobs with an average salary of \$122,318.

Yet, there were only 1,598 graduates in computer science in 2020 and only 57% of all public high schools teach a foundational computer science course.

Computer science in Colorado

- Only **2,697 exams were taken in AP Computer Science by high school students in Colorado** in 2020 (922 took AP CS A and 1,775 took AP CSP).
- Only 27% were taken by female students (21% for AP CS A and 29% for AP CSP); only 390 exams were taken by Hispanic/Latino/Latina students (74 took AP CS A and 316 took AP CSP); only 63 exams were taken by Black/African American students (14 took AP CS A and 49 took AP CSP); only 8 exams were taken by Native American/Alaskan students (2 took AP CS A and 6 took AP CSP); only 2 exams were taken by Native Hawaiian/Pacific Islander students (1 took AP CS A and 1 took AP CSP).
- Only **154 schools** in CO (45% of CO schools with AP programs) offered an AP Computer Science course in 2019-2020 (24% offered AP CS A and 37% offered AP CSP), which is 14 more than the previous year. There are fewer AP exams taken in computer science than in any other STEM subject area.
- Teacher preparation programs in Colorado only graduated 1 new teacher prepared to teach computer science in 2018.
- According to a representative survey from Google/Gallup, school administrators in CO support expanding computer science education opportunities: 61% of principals surveyed think CS is just as or more important than required core classes. And their biggest barrier to offering computer science is the lack of funds for hiring and training teachers.

What can you do to support K-12 CS education in Colorado?

- Send a letter to your school/district asking them to expand computer science offerings at every grade level: [www.code.org/promote/letter](https://code.org/promote/letter)
- Find out if your school teaches computer science or submit information about your school's offerings at www.code.org/yourschool.
- Visit www.code.org/educate/3rdparty to find out about courses and curriculum from a variety of providers, including Code.org.

Code.org's impact in Colorado

- In Colorado, Code.org's curriculum is used in
 - 29% of elementary schools
 - 29% of middle schools
 - 25% of high schools
- There are 13,502 teacher accounts and 802,124 student accounts on Code.org in Colorado.
- Of students in Colorado using Code.org curriculum last school year,
 - 38% attend high needs schools
 - 19% are in rural schools
 - 45% are female students
 - 8% are Black/African American students
 - 22% are Hispanic/Latino/Latina students
 - 1% are Native American/Alaskan students
 - 1% are Native Hawaiian/Pacific Islander students
 - 46% are white students
 - 4% are Asian students
 - 5% are students who identify as two or more races
- Code.org, its regional partner(s) mindSpark Learning, and 20 facilitators have provided professional learning in Colorado for
 - 1,745 teachers in CS Fundamentals (K-5)
 - 247 teachers in Exploring Computer Science or Computer Science Discoveries
 - 135 teachers in Computer Science Principles

What can your state do to improve computer science education?

States and local school districts need to adopt a broad policy framework to provide all students with access to computer science. The following nine recommendations are a menu of best practices that states can choose from to support and expand computer science. Not all states will be in a position to adopt all of the policies. Read more about these 9 policy ideas at https://code.org/files/Making_CS_Fundamental.pdf and see our rubric for describing state policies at <http://bit.ly/9policiesrubric>.

□ **State Plan** - Colorado **has not** yet created a state plan for K-12 computer science. A plan that articulates the goals for computer science, strategies for accomplishing the goals, and timelines for carrying out the strategies is important for making computer science a fundamental part of a state's education system.

□ **K-12 Standards** - Colorado **does not yet** have rigorous computer science standards publicly available across K-12. Computer science has often been confused with broader technology education in schools. The state could strengthen its computer science programs by publicly adopting discrete standards for computer science focused on both the creation and use of software and computing technologies at all levels of K-12 education. These standards can be guided by the concepts, practices, and recommendations in the K-12 Computer Science Framework, found at <http://www.k12cs.org>.

□ **Funding** - SB 23-115 (FY 2023), HB 22-1329, SB 21-205 (FY 2022), HB 20-1360 (FY 2021), and SB 19-207 (FY 2020) appropriated \$805,681, \$801,681, \$801,658, \$801,675, and \$1,048,600 for Computer Science Education Grants for Teachers, which give priority to applications serving rural areas, areas with high numbers of students eligible for free and reduced-price meals, or areas with high numbers of students from underrepresented racial and ethnic groups. HB 18-1322 (FY 2019) allocated \$500K for K-5 teacher professional development. SB 17-296 (FY 2018 and 2019) allocated up to \$500K annually for teachers pursuing postsecondary computer science education. HB 16-1289 (FY 2017) offered schools \$1K for each student enrolled in AP computer science. Due to COVID-19 related budget cuts, the state reduced funding for FY 2021 from planned allocations (\$250K annually for FY 2021, 2022, and 2023 in HB 19-1277).

□ **Certification** - Colorado **does not yet** have clear certification pathways for computer science teachers. The expansion of K-12 computer science education is hampered by the lack of qualified computer science teachers. We can grow their ranks by creating clear, navigable, and rewarding professional paths for computer science teachers.

□ **Pre-Service Programs** - Colorado **has not yet** established programs at institutions of higher education to offer computer science to preservice teachers. The computer science teacher shortage can be addressed by exposing more preservice teachers to computer science during their required coursework or by creating specific pathways for computer science teachers.

□ **Dedicated State Position** - The Colorado Department of Education has a Computer Science Content Specialist.

☐ **Require High Schools to Offer** - Colorado **does not yet** require that all secondary schools offer computer science. The state can support the expansion of computer science courses by adopting policies that require schools to offer a computer science course based on rigorous standards, with appropriate implementation timelines and allowing for remote and/or in-person courses.

☐ **Count Towards Graduation** - Colorado passed a permissive and encouraging policy to allow computer science to count as either a mathematics or science credit for graduation, but it is a district decision.

☐ **Higher Ed Admission** - A computer science course with a mathematics prerequisite can count as a mathematics credit required for admission at institutions of higher education in Colorado.

☐ **Graduation Requirement** - Colorado **does not yet** require students to take computer science to earn a high school diploma. Graduation requirements ensure that all students get exposure to computer science.

Follow us!

Join our efforts to give every student in every school the opportunity to learn computer science. Learn more at code.org, or follow us on [Facebook](#) and [Twitter](#).

Launched in 2013, Code.org® is a nonprofit dedicated to expanding access to computer science, and increasing participation by women and underrepresented youth. Our vision is that every student in every school should have the opportunity to learn computer science.

Who can you connect with locally to talk about K-12 CS education policy?

- You can reach Code.org's policy contact for your state, Anthony Owen, at anthony.owen@code.org.

Data is from the Conference Board for job demand, the Bureau of Labor Statistics for state salary and national job projections data, the College Board for AP exam data, the National Center for Education Statistics for university graduate data, the Gallup and Google research study Education Trends in the State of Computer Science in U.S. K-12 Schools for parent demand, the 2018 Computer Science Access Report for schools that offer computer science, and Code.org for its own courses, professional learning programs, and participation data.