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 45% of U.S. high schools teach any computer science courses and only 11% of bachelor's degrees are in Computer Science. We need to improve access for all students, including groups who have traditionally been underrepresented.

Computer science in Colorado

- Colorado currently has 13,408 open computing jobs (2.6 times the average demand rate in Colorado).
- The average salary for a computing occupation in CO is $101,518, which is significantly higher than the average salary in the state ($55,820). The existing open jobs alone represent a $1,361,151,164 opportunity in terms of annual salaries.
- Colorado had only 1,266 bachelor’s degrees in Computer Science in 2018; only 16% were female.
- In Colorado, only 38% of all public high schools teach a foundational computer science course.
- Only 2,460 exams were taken in AP Computer Science by high school students in Colorado in 2019 (1,046 took AP CS A and 1,414 took AP CSP).
- Only 26% were female (22% for AP CS A and 29% for AP CSP); only 445 exams were taken by Hispanic/Latino/Latina students (123 took AP CS A and 322 took AP CSP); only 52 exams were taken by Black/African American students (23 took AP CS A and 29 took AP CSP); only 11 exams were taken by Native American/Alaskan students (2 took AP CS A and 9 took AP CSP); only 1 exam was taken by Native Hawaiian/Pacific Islander students (1 took AP CS A and 0 took AP CSP).
- Only 140 schools in CO (38% of CO schools with AP programs) offered an AP Computer Science course in 2018-2019 (21% offered AP CS A and 27% offered AP CSP), which is 11 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 did not graduate a single 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
  - To your elected officials asking them to support computer science education policy in Colorado: www.votervoice.net/Code/campaigns/58463/respond
- 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.

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, Alexis Harrigan, at alexis@code.org.

Code.org's impact in Colorado

- In Colorado, Code.org's curriculum is used in:
  - 25% of elementary schools
  - 24% of middle schools
  - 20% of high schools
- There are 10,154 teacher accounts and 560,867 student accounts on Code.org in Colorado.
- Of students in Colorado using Code.org curriculum last school year,
  - 35% attend high needs schools
  - 17% are in rural schools
  - 43% are female students
  - 42% are students from marginalized racial and ethnic groups underrepresented in computer science (Black/African American, Hispanic/Latino/Latina, Native American/Alaskan, or Native Hawaiian/Pacific Islander)
- Code.org, its regional partner(s) mindSpark Learning, and 20 facilitators have provided professional learning in Colorado for:
  - 1,468 teachers in CS Fundamentals (K-5)
  - 178 teachers in Exploring Computer Science or Computer Science Discoveries
  - 103 teachers in Computer Science Principles

“Computer Science is a liberal art: it’s something that everybody should be exposed to and everyone should have a mastery of to some extent.”

— Steve Jobs
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** - HB 20-1360 (FY 2021) and SB 19-207 (FY 2020) appropriated $801,657 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.

**IHE 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.

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.

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.