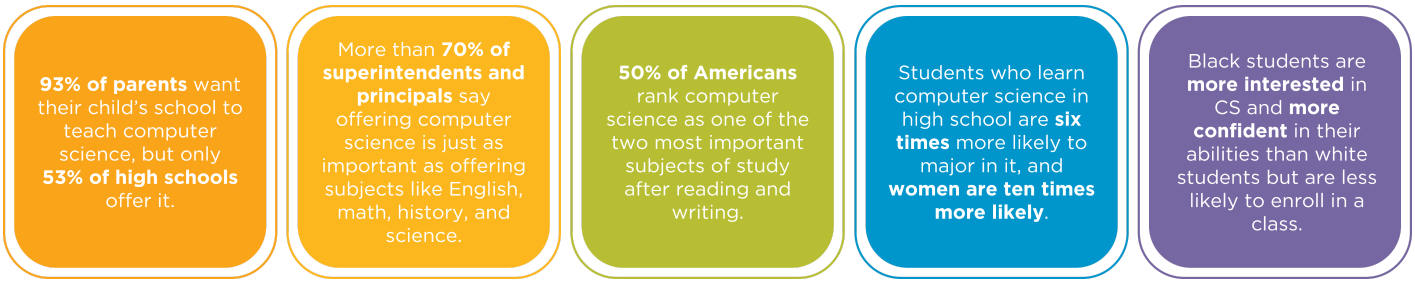
Support K-12 Computer Science Education in Massachusetts

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 57.5% 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.



Yet, there were only 3,838 graduates in computer science in 2020 and only 83% of all public high schools teach a foundational computer science course.

Computer science in Massachusetts

- Only **5,590 exams were taken in AP Computer Science by high school students in** Massachusetts in 2020 (2,450 took AP CS A and 3,140 took AP CSP).
- Only 30% were taken by female students (27% for AP CS A and 33% for AP CSP); only 462 exams were taken by Hispanic/Latino/Latina students (153 took AP CS A and 309 took AP CSP); only 343 exams were taken by Black/African American students (91 took AP CS A and 252 took AP CSP); only 16 exams were taken by Native American/Alaskan students (5 took AP CS A and 11 took AP CSP); only 5 exams were taken by Native Hawaiian/Pacific Islander students (1 took AP CS A and 4 took AP CSP).
- Only **252 schools** in MA (55% of MA schools with AP programs) offered an AP Computer Science course in 2019-2020 (35% offered AP CS A and 38% offered AP CSP), which is 32 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 Massachusetts 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 MA support expanding computer science education opportunities: 70% of principals surveyed think CS is just as or more important than required core classes. And one of their biggest barriers 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 Massachusetts?

- Send a letter to your school/district asking them to expand computer science offerings at every grade level: %a{href:"https://code.org/promote/letter"} www.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 Massachusetts

- In Massachusetts, Code.org's curriculum is used in
    - 22% of elementary schools
    - 28% of middle schools
    - 29% of high schools
- There are 15,867 teacher accounts and 768,522 student accounts on Code.org in Massachusetts.
- Of students in Massachusetts using Code.org curriculum last school year,
    - 0% attend high needs schools
    - 13% are in rural schools
    - 45% are female students
    - 12% are Black/African American students
    - 13% are Hispanic/Latino/Latina students
    - 0% are Native American/Alaskan students
    - 0% are Native Hawaiian/Pacific Islander students
    - 50% are white students
    - 9% are Asian students
    - 6% are students who identify as two or more races
- Code.org, its regional partner(s) CSforMA, and 13 facilitators have provided professional learning in Massachusetts for
    - 1,037 teachers in CS Fundamentals (K-5)
    - 332 teachers in Exploring Computer Science or Computer Science Discoveries
    - 146 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 ten 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 10 policy ideas at **https://advocacy.code.org/2023_making_cs_foundational.pdf** and see our rubric for describing state policies at **http://bit.ly/9policiesrubric**.

 State Plan - The Massachusetts Department of Elementary and Secondary Education created the 2019 Digital Literacy Now 3 Year Plan, which includes goals, strategies, and timelines for advancing K–12 computer science. One goal of the plan is to focus on ensuring that female students, students from marginalized racial and ethnic groups, and underserved populations receive high-quality instruction.

 K-12 Standards - Massachusetts adopted K–12 digital literacy and computer science standards in 2016.

 Funding - H4000 (FY 2020) allocated $1M for the implementation of engaging and rigorous Digital Learning Computer Science education; $590K went to the Digital Literacy Now grant program for school district teams to develop digital literacy and computer science state plans and complete professional development. The grant program prioritizes underserved students, including economically disadvantaged students, English language learners, students receiving special education services, students from marginalized racial and ethnic groups, and students in rural areas. H4800 (FY 2019) and H3650 (FY 2016) allocated $850K and $1.7M for professional development and implementation support and required a one-to-one private match.

 Certification - In Massachusetts, teachers with or without existing licensure can obtain a 5–12 certification by demonstrating competency in each of the computer science standards through a combination of academic coursework, professional development, mentorship experience, teaching experience, passing the Pearson and/or Praxis CS exam, and/or by completing an approved teacher preparation program.

 Pre-Service Programs - The Massachusetts Department of Elementary and Secondary Education has approved teacher preparation programs leading to certification in computer science and lists these programs publicly.

 Dedicated State Position - The Massachusetts Department of Elementary and Secondary Education has a Computer Science Content Coordinator.

 Require High Schools to Offer - Massachusetts **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 - In Massachusetts, a computer science course can substitute for either a mathematics or laboratory science course if the course includes rigorous mathematical or scientific concepts and aligns with the state computer science standards. Students in technical and vocational

programs may substitute a computer science course for a foreign language.

 Higher Ed Admission - A computer science course can count as a mathematics, science, or foreign language credit required for admission at institutions of higher education if the course meets certain criteria.

 Graduation Requirement - Massachusetts **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, Hannah Weissman, at hannah.weissman@code.org.
- The Expanding Computing Education Pathways (ECEP) Alliance (**www.ecepalliance.org**), an NSF funded Broadening Participation in Computing Alliance, seeks to increase the number and diversity of students in computing and computing-intensive degrees by promoting state-level computer science education. ECEP supports 22 states and the territory of Puerto Rico to develop effective and replicable interventions to broaden participation in computing and to create state-level infrastructure to foster equitable computing education policies. You can reach your ECEP point of contact Anne DeMallie at ademallie@doe.mass.edu.

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.