Ten Policy Ideas to Make Computer Science Foundational to K–12 Education

Computing is a foundational part of daily life and nearly all occupations — from automated farm machinery to using artificial intelligence for medical diagnostics. All students must be exposed to computer science during their K-12 schooling. Computer science teaches students to be more than just users of technology; it teaches them to be creators of technology by developing critical thinking and problem-solving skills. Computer science allows students to access the highest-paying and fastest-growing jobs in America.

Only 57% of high schools offer a computer science course for students. There are particularly large disparities in access to computer science courses for small schools, low-income communities, Native American/Alaskan students, and Black/African-American students.
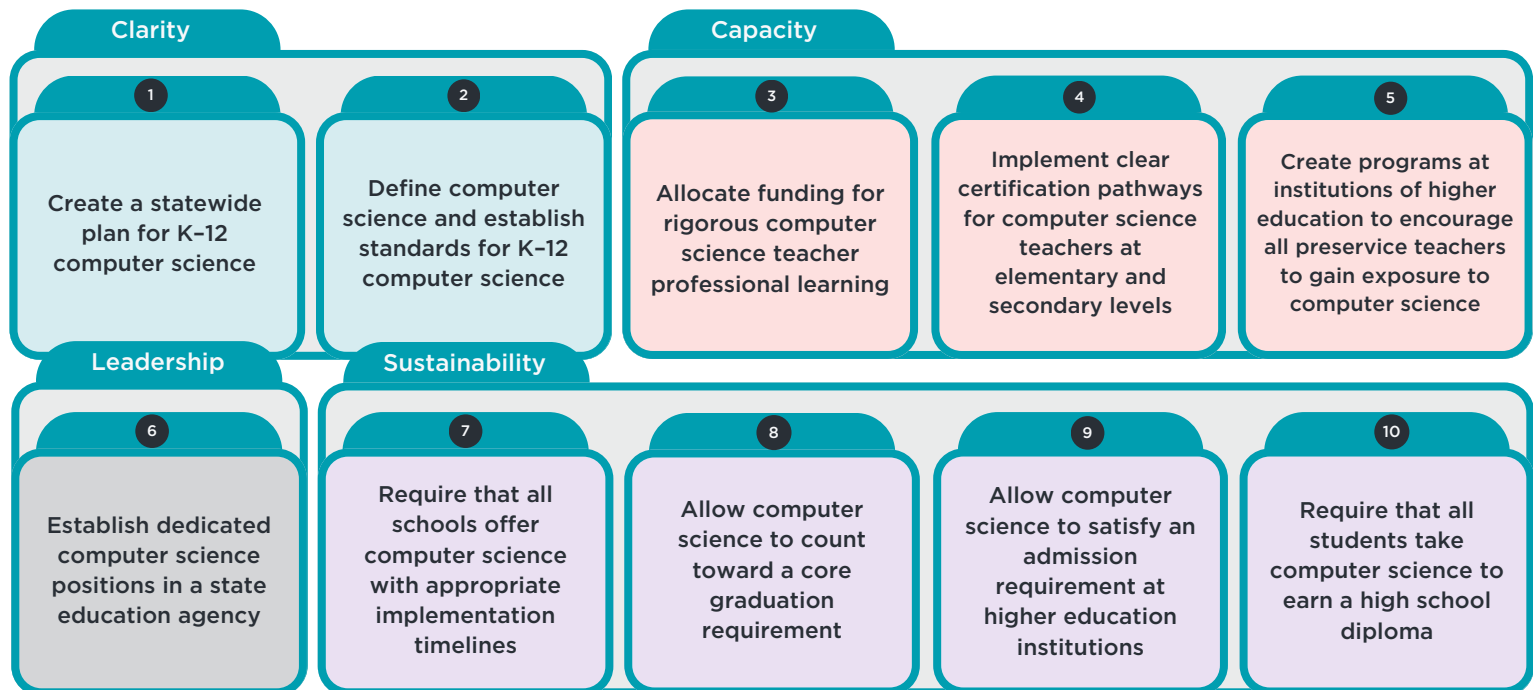
While nearly half of our high schools are not teaching computer science, substantial progress has occurred in the last several years. States have recognized the need for change; every state has passed policies encouraging computer science growth and adoption in their school system. However, there is more work to be done.

States must continue investing in a broad policy framework that expands K-12 computer science. The ten recommendations listed below are designed to build and sustain a comprehensive system of teaching and learning computer science. These policies are built on five principles: **Equity and Diversity, Clarity, Capacity, Leadership, and Sustainability.**

Adopting these policies does not guarantee student success in computer science. We need great teachers and school leaders invested in ensuring all students have positive experiences in computer science. Policies must also be continually revisited and adjusted to meet student and teacher needs.

10 ideas to make computer science foundational to K–12 education:

Clarity

1. Create a statewide plan for K–12 computer science

2. Define computer science and establish standards for K–12 computer science

Capacity

3. Allocate funding for rigorous computer science teacher professional learning

4. Implement clear certification pathways for computer science teachers at elementary and secondary levels

5. Create programs at institutions of higher education to encourage all preservice teachers to gain exposure to computer science

Leadership

6. Establish dedicated computer science positions in a state education agency

Sustainability

7. Require that all schools offer computer science with appropriate implementation timelines

8. Allow computer science to count toward a core graduation requirement

9. Allow computer science to satisfy an admission requirement at higher education institutions

10. Require that all students take computer science to earn a high school diploma

These policies are designed to provide a framework and a strong starting position for states, although they may need to be modified to best fit individual state needs. Articulated below are strategies to ensure these policies are implemented successfully. State officials should bring together key stakeholders from the state and local education agencies, representatives from the state's executive branch, local computer science teacher leaders, national groups with expertise in computer science education, and industry leaders and legislators to discuss these ideas and identify how to implement these policies best.

Equity and Diversity

Access to and equity within rigorous and engaging computer science courses should be top priorities for policymakers and incorporated into all ten policies. Data clearly shows students from communities historically underrepresented in computer science, including small schools, low-income students, Native American/Alaskan students, and Black/African American students, have lower rates of access to computer science courses. Even when all students have access, there are still disparities in participation, particularly among female students. If we do not address these disparities in access and participation, we will continue to exclude entire populations from this fast-growing field and lose their valuable contributions.

Equitable access and participation should be intentionally addressed in each of the ten policy ideas, with the goal that computer science classrooms reflect the student population. Prioritizing equity requires policymakers to give specific attention to underserved populations and under-resourced schools. Policy proposals should target Title I schools or other under-resourced schools, including small schools, urban schools, and rural schools. In drafting and proposing equitable policies seeking representative computer science participation, states should include specific language focusing on female students and groups underrepresented in computer science.

For example, in 2021, Mississippi published its state plan in which one of their state goals is: "Increase the percentage of underrepresented groups enrolled in computer science at the high school level (Grades 9-12) by 75% and increase elementary and middle school exposure to computer science to 100%." They identify several strategies to achieve greater diversity in Mississippi classrooms, including teacher professional development and focusing on bringing diverse speakers to classrooms.

Colorado is another example; since 2020, the Department of Education has administered a grant program with the specific goal: "to increase enrollment, and/or participation, of traditionally underrepresented students in computer science education activities." Proactively building equity into legislation and other policy proposals ensures access for students who may otherwise never experience computer science.

Comprehensive data must be collected and reported to achieve the goal of computer science classrooms accurately reflecting the student population. Many states have developed robust data processes and use this data to continue working on equitable access. For example, Alabama requires all schools to report their computer science courses and enrolled student demographics. Additionally, the state publishes a public report which details the data and enables a targeted approach for schools that need more significant support for all students to take computer science.

Prioritizing equity and diversity is necessary for ensuring that all students have the opportunity to take computer science during their K-12 education.

Clarity

Create a State Plan for K–12 Computer Science

Computer science courses have historically not been integral to a state's education priorities.

Making computer science a foundational part of a state's education system may mean adding a new subject to most schools. States will need to create roadmaps to address policy and implementation issues to integrate computer science into their existing system.

The plan should articulate the goals for computer science, strategies for accomplishing the goals, and timelines for carrying out the strategies. The plan should also be revisited and updated regularly. Equitable access to K–12 computer science must be the heart of a state's plan. The policies that should be part of a plan should include, at a minimum, comprehensive K–12 standards, a roadmap to enable all schools in the state to offer computer science courses, funding sources for professional learning, and a detailed runway to enable a high school graduation requirement.

Define Computer Science and Establish K–12 Computer Science Standards

High-quality standards create shared expectations for all teachers and students and help prepare students for success in various postsecondary opportunities. Standards are also crucial for defining the difference between computer science and digital literacy.

While digital literacy is also necessary for our students, it is important to distinguish that computer science is about creating technology rather than just using technology. States should develop discrete standards for computer science education guided by the concepts, practices, and recommendations in the K–12 Computer Science Framework. As new technologies emerge and the field of computer science grows, states should work to ensure their standards reflect the changing field.

Clarity around the definition of computer science shared goals and strategies strengthen state efforts to expand access and participation in computer science.

Capacity

Allocate Funding for Rigorous Computer Science Teacher Professional Learning

As computer science is a newer subject for many schools, there is a need to fund professional learning and provide continual support for teachers. States should provide resources to prepare in-service teachers from diverse backgrounds to teach K–12 computer science. Funding priority should be given to districts where a demonstrable effort will be made to engage underrepresented groups.

Implement 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 which enables disparities in access to persist. By creating clear and navigable professional paths tied to content knowledge for computer science teachers, we can grow their ranks and increase equitable access. Existing incentives for teacher endorsements in other high-need STEM fields should be replicated for computer science teacher endorsements. Certification programs should be flexible and use innovative approaches such as micro-credentials to reduce barriers for interested teachers. Existing computer science teachers should be waived into any new system of endorsements. In addition, computer science professionals should be encouraged to become teachers through expedited certification processes, ensuring that a transition to the classroom is as seamless as possible.

Create Programs to Encourage all Preservice Teachers to Gain Exposure to Computer Science

A computer science module or entire course during preservice teacher programs provides a foundational background for teachers to meet the needs of their students, regardless of grade or subject matter. Additionally, preservice programs should create specific pathways for preservice teachers interested in further pursuing computer science to gain certification.

States should create funding incentives for preservice education programs to create and sustain pathways in computer science education. For preservice teachers who do not attend an institution with a computer science pathway, states should create a scholarship program for them to take computer science courses. In addition, to address equity concerns, states should fund partnership opportunities between local school districts and schools of education to create direct pathways for teachers into high-need school districts.

School capacity for offering computer science courses depends on the availability of qualified teachers. It is thus reliant upon state-level resources to prepare preservice and in-service computer science teachers, focusing on ensuring a diverse computer science teaching pool.

Leadership

Establish Dedicated Computer Science Positions in State and Local Education Agencies

Computer science must have a dedicated position at the state education agency as with other subjects. As schools add and expand computer science offerings, they will benefit from the ability to receive support and direction from the state agency. This position would promote the expansion of computer science in the state through new policies such as professional learning of teachers, district engagement and capacity building, and community events. This position would also monitor any disparities in student access and participation. Creating a statewide computer science leadership position will signal to schools that computer science is a vital course offering needed at all levels of education and hopefully encourage local education agencies to create similar positions. As states and districts start to have more robust programs, more than one position is often needed, particularly given the difference between elementary and secondary computer science.

Leadership is also crucial within school buildings. The more leaders champion computer science education, the more students receive high-quality instruction.

Sustainability

Require All Schools to Offer Computer Science

Given the important role computer science plays in our economy and the world, ensuring all students have access to computer science in K–12 is critical. Only about half of U.S. high schools offer computer science, and there is no comprehensive data about elementary and middle school offerings. This policy should have appropriate multi-year runways, which may differ for elementary and secondary schools. States should also build flexible options, with particular attention paid to small schools, as they often face additional barriers when expanding course offerings. When necessary, states may allow schools to use virtual options; however, all schools should aim to offer in-person computer science experiences. Schools must work to ensure their computer science offerings are truly available for all students: at the middle and high school levels, courses without prerequisites should be available, and at the elementary level, computer science should not be just extracurricular for particular student groups.

Allow Computer Science to Count Towards a Core Graduation Requirement

Currently, all states have clear, publicly accessible policies allowing computer science courses to satisfy existing core high school graduation requirements. This policy has allowed students to fit computer science courses into their busy class schedules while still staying on track for graduation. States should continue to have flexible options available for students to take advantage of computer science opportunities.

Allow Computer Science to Satisfy an Admission Requirement at Higher Education Institutions

College and university admission policies must align with high school graduation requirements. If a computer science course can count toward high school graduation but does not meet higher education entrance requirements, students may be discouraged from taking computer science during their secondary education. We know that earlier exposure to computer science is crucial for young women and underrepresented ethnic and racial groups. State leaders should work with higher education institutions to ensure credit and articulation policies align with secondary school graduation requirements.

Require That All Students Take Computer Science to Earn a High School Diploma

Requiring all schools to offer computer science and provide access to all students is a critical step. However, several years of data from 40+ states have shown that gaps in participation persist even when every student has access to computer science. In states where every school offers computer science but is not a graduation requirement, fewer than 40% of enrolled students in computer science courses are young women. Requiring all students to take computer science closes the gender and racial gaps in K-12 computer science participation. This policy should have at least a five-year year runway for districts, teachers, and students to prepare for the new requirement, and state agencies should provide school districts with a list of courses that can fulfill this requirement. Virtual courses should be allowed, but there should be a concerted effort to provide all students with the opportunity to take in-person classes. As with all policies, the state agency should monitor student data to ensure equitable student outcomes.

Creating space for computer science in schools by requiring schools to offer or requiring all students to take computer science ensures the sustainability of computer science initiatives.

The Code.org Advocacy Coalition

The global movement to ensure every student at every school has the opportunity to take computer science continues to grow at an unprecedented rate. The Code.org Advocacy Coalition works to expand further, support, and sustain this movement.

Who We Are

Bringing together more than 100 industry, nonprofit, and advocacy organizations; the Code.org Advocacy Coalition works to build and support a movement in developing and implementing policies to make computer science a foundational part of the K–12 education system.

What We Do

Advocate for computer science education
We engage coalition members in all states to help build support for and take action on K–12 computer science initiatives.

Leverage resources
The Coalition provides a forum for members to share common challenges and collaborate on solutions. Internal and external resources, including research, data, and media engagement, are all shared between Coalition members to amplify the magnitude of our individual organizations' impact.

Build networks
Coalition members learn from each other and work together to advance key priorities. The diverse set of organizations that make up the Code.org Advocacy Coalition bring their specialized expertise, constituencies, and strategies to mobilize efforts around computer science education.

How We Do It

Every month, the Coalition convenes on a call to discuss federal and state policy updates, strategies for advancing policy in states with active legislation and/or initiatives, and coordinating on-the-ground efforts to advocate for the Coalition's policy priorities. The Coalition also sends monthly updates focused on policy developments and spotlights key activities and organizations.

Results

Since the start of the Code.org Advocacy Coalition, states have collectively passed over 300 policies, including over $300 million in state funding allocated toward these efforts.

Learn More

Visit **advocacy.code.org** to learn more about the Code.org Advocacy Coalition, find a complete list of Coalition members, and the current state of computer science across the U.S.

Advocacy Coalition