



## Championing K-12 Computer Science Education

An Opportunity for Governors to Lead on a Critical Issue for K-12 Education and Economic Development

### Background

Computing is now a fundamental part of daily life, commerce, and just about every occupation in today's economy. According to the Conference Board, there are more than 500,000 current open computing jobs across the country. In order to meet the demands of the workforce and prepare every person to be a productive citizen, it is essential that students are exposed to the field of computer science in our K-12 system. Computer science (CS) is foundational in transforming the way students think about technology, and teaches them essential problem solving skills. Moreover, it puts students on the path toward some of the highest-paying, fastest-growing jobs in America.

Yet, today only 1 out of 4 schools offers high quality computer science; further, only about 1 out of 5 students taking AP CS are female, and even fewer are underrepresented students of color. An opportunity and equity gap exists that state leaders are starting to address through implementing state policy measures and raising awareness of the importance of high-quality CS education in K-12.

### Learn the Stats for Your State

To find out specific information about computer science in your state, please visit <http://code.org/promote>, which lists state-specific statistics, including the number of current open computing jobs, the number of CS graduates, and progress made on the 8 model policies identified by Code.org as important to expanding access to K-12 CS.

### Leading on Policy

The *Governors' Partnership for K-12 Computer Science* (the Partnership) is a group of state leaders committed to advancing policy and funding to expand access to – and increase equity in – K-12 CS. As part of the Partnership, governors commit to working toward the following priority CS policies that will help meet the goal of increasing access to K-12 computer science:

1. Enable all high schools to offer at least one rigorous computer science course;
2. Fund professional learning opportunities so teachers can be prepared to teach these courses; and,
3. Create a set of high-quality academic K-12 computer science standards to guide local implementation of courses.

### Enacting the Three Priority CS Policies

Each state's educational system and path for enacting priority policies is different. The process can range from working with the legislature to pass comprehensive computer science legislation, to making CS professional development a priority in the Governor's proposed budget, to working with the State Board of Education to change policies, to enacting executive orders (e.g., creating a task force to develop and implement a comprehensive plan for addressing these issues).

Because the *Three Priority CS Policies* can be accomplished in a variety of ways, Code.org serves as a resource to help apply these principles to each state's unique policy environment.

1. *Enable all high schools to offer at least one rigorous computer science course*

With only a quarter of schools teaching CS, the lack of access hurts state economies and creates major inequities in education, particularly for those groups that have been traditionally underrepresented in CS. States and local school districts recognize the need for change. Thirty-one states have recently enacted policies to allow CS courses to count toward core mathematics or science high school graduation requirements. This is a good step, but it is only the first of many.

To address the issue of access, as a starting point, states should adopt policies that require high schools to offer at least one CS course based on rigorous standards. Because this goal can't be reached overnight, schools and state education authorities should effectively plan for implementation. Arkansas (through legislation) and West Virginia (through regulatory action by the State Board of Education) have both enacted the requirement that all high schools offer CS.

2. *Fund professional learning opportunities so teachers can be prepared to teach these courses*

In order to offer rigorous CS courses, there must be teachers to teach them. Because computer science courses are often offered as electives – if offered at all – there is a lack of funding for teacher professional development and staffing support at the district level. States should provide professional development resources by creating matching fund opportunities to bring computer science to school districts. This will expand the capacity for in-service teachers and motivate pre-service teachers to pursue teaching CS.

Arkansas, Washington, Idaho, and Virginia are four exemplar states that have committed funding for CS professional development – addressing a critical pipeline challenge in K-12 CS education.

3. *Create a set of high-quality academic K-12 computer science standards to guide local implementation of courses*

Ambiguity regarding CS education and broader technology has worked against CS curriculum in schools. States have largely focused on teaching students how to use technology through existing subjects, as opposed to dedicating courses to computer science, which includes computational thinking and programming and teaches students to build, not just consume, technology. States should adopt discrete standards for CS that focus on both the creation and use of software and computing technologies at all levels of K-12 education, and define learning targets to ensure consistency across the state.

As a guide to support states in the development of CS standards, the Association for Computing Machinery, Computer Science Teachers Association, Code.org, Cyber Innovation Center, and National Math and Science Initiative joined forces with more than 100 advisors within the computing community (higher ed faculty, researchers, K-12 teachers), several states and large school districts, technology companies, and other organizations to steer a process to develop conceptual guidelines for states and districts creating a K-12 pathway in CS. This Framework will be released in September 2016, and will be useful for the establishment of standards and

subsequent curriculum decisions at the state and district levels. See <http://k12cs.org> to learn more and track progress.

### **Additional Policy Considerations**

While course offering requirements, PD funding, and standards are the cornerstone of strong CS policy, there are other policy levers that state leaders can pursue to increase access and equity in K-12 CS education.

- Establish a dedicated state-level computer science position;
- Allow computer science to count for a math or science graduation requirement;
- Allow computer science to count as a math or science admission requirement for institutions of higher education;
- Implement clear certifications pathways for computer science teachers; and
- Create incentives at institutions of higher education to offer computer science to pre-service teachers.

### **Elements of a Successful State Computer Science Plan**

Developing a comprehensive state plan for K-12 CS education is a productive starting point for engaging stakeholders and building support for policy changes that will expand access to and increase equity in CS education.

Components, as illustrated by [Arkansas' CS Plan](#), could include:

- Clear articulation of vision for K-12 CS in the state and connection to broader education and economic development goals.
- Goals and tasks for the State Education Agency and other leaders associated with:
  - Standards and Support for Local Curriculum Development;
  - Licensure and Professional Development;
  - Communication and Outreach (e.g., to districts, schools, parents, students, and other stakeholders); and
  - Sustainability and Program Growth (e.g., funding, partnerships, outside resources; etc).

### **Further Promoting K-12 CS Education**

Governors are in the position to raise awareness of the importance of computer science education, not only to create momentum for policy changes, but also to drive demand for courses among students and parents, and to engage and support district leaders. Some ideas include:

- Include the Three State Policies in your State of the State Address;
- Write an Op-Ed for your state's local paper;
- Travel across the state to promote computer science efforts; and/or,
- Participate in Hour of Code in December.