The Engine of Change and Economic Growth: Computer Science

August 2, 2018
CS Jobs Leading the Way

Computing jobs are the #1 source of new wages in the United States

There are 500,000 computing job openings: These jobs are in every industry and every state, and they’re projected to grow at twice the rate of all other jobs.

Source: Bureau of Labor Statistics
Of the more than 9 million STEM jobs available in the next decade, half will require computing experience.

Computer science experience is fast becoming an imperative for today’s students and the workforce of tomorrow.
CS and STEM

Clear need to address disconnect between job market and education system

- 58% of all new jobs in STEM are in computing
- 8% of STEM graduates are in Computer Science
- 90% of parents want their child to study computer science
- 40% of schools teach computer programming

Sources: Bureau of Labor Statistics, National Center for Education Statistics, Gallup
Challenges and Opportunities to Expanding Computer Science

Challenges
- Teacher shortage in the field of computer science
- Enrollment and participation barriers
- Sustainability of computer science programs

Opportunities
- Provide state support for teacher training and professional development
- Address enrollment and participation barriers by requiring all schools offer a CS
- Financial incentives to support course offerings
AP Computer Science Principles: A Solution for States
The Diversity Challenge

Shortage of women and minorities in computer science

Percentage of Computer Science Majors Who Were Women

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage Who Were Women</th>
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<tbody>
<tr>
<td>1985</td>
<td>37%</td>
</tr>
<tr>
<td>2009</td>
<td>18%</td>
</tr>
<tr>
<td>2012</td>
<td>18%</td>
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Source: Department of Education

Percentage of Today's Software Workforces

- Male: 80%
- Female: 20%
- Asian: 29%
- Hispanic: 5%
- Black: 4%

Source: Bureau of Labor Statistics
AP CSP was designed to encourage broader participation in computer science, especially among women and minorities.

2008
The College Board held a higher education faculty colloquium

2009 – 2010
20 professors conceptualized the major components of a curriculum framework for a new introductory CS course – Computer Science Principles (NSF grant funded)

2011
100 institutions reviewed the Curriculum Framework and agreed to offer credit and/or placement for the course

2012 – 2015
Piloted and finalized the AP CSP course and exam

2016-2017
Launch of the AP CSP course and exam
Launched in the fall of 2016, the AP CSP course introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology impact the world. In AP CSP, students develop computational thinking skills through creative problem-solving and real-world application building.

AP CSP Goals:

1. Make Computer Science more engaging and accessible
2. Reach students underrepresented in computer science
3. Better prepare students for the job market of today and tomorrow
The largest course launch in AP’s 60-year history
Computational Thinking Practices
1. Connecting computing
2. Creating computational artifacts
3. Abstracting
4. Analyzing problems and artifacts
5. Communicating
6. Collaborating

Big Ideas
1. Creativity
2. Abstraction
3. Data and information
4. Algorithms
5. Programming
6. The Internet
7. Global impact
Low Barrier to Entry and An Invitation to All

- No prior computer science experience needed
- Algebra I recommended as a prerequisite
- Student choice for projects
- Real-world applications to a variety of majors and professions
Addressing Challenges to Expanding Computer Science:
Creating Success

To get there, these states must consider the conditions that exist in their respective states.

- As states deliberate making significant commitments to prepare students for computer science and STEM jobs, they should consider opportunities to maximize their investments.

- States should advance policies which ensure widespread expansion of coursework that prepares students for computer science and STEM jobs.
Questions To Ask

• How many open computing jobs are there in your state?

• How many students in your state graduated with computer science degrees?

• How many students took Advanced Placement (AP) exams?
Access

All public high schools are required to offer computer science

- **Delaware**, in 2017, passed a law requiring all public high schools to offer at least one computer science course by the 2020-2021 school year.
All public high schools are required to offer at least one AP course.
Access

Students are advised into AP courses based on objective metrics.

The College Board encourages that schools employ a range of metrics to identify AP-ready students.

- North Carolina, as required by statute, uses a student’s performance on the PSAT/NMSQT to identify students who are prepared to be successful in advanced courses. The statute also states that students may be identified for potential enrollment in advanced courses based on other criteria established by schools to increase access to those courses for their students.
• **Indiana’s** state department of education covers exam fees for English, math and science exams taken by students. Covered exams include AP CS A and AP CSP. In addition, exam fees are not charged to students who qualify for free/reduced lunch.
Access

Allowing computer science to satisfy a core graduation requirement

- New Mexico announced earlier this year that computer science courses, including AP Computer Science A and AP Computer Science Principles, can be used to meet math or science high school graduation credit requirements.
Support

Financial incentives to support course offerings and success

- **Colorado**, through the Advanced Placement Incentives Pilot Program, awards funds to rural schools for each student completing an AP course and corresponding AP Exam. The funds can be used for professional development, teacher incentives, or enhancing online access to AP.
States With Computer Science Standards
Contact Information

Monica Roman, Sr Dir of AP Partnership Development & Strategy
mroman@collegeboard.org

Juan Navarro, Associate Director of K-12 Policy
jnavarro@collegeboard.org