



Maryland Center for Computing Education

A Partnership for Investing in the Future

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Outline

- What is the Need?
- Who is the Team?
- What is the Plan?
- Where are the Resources?

What is the Need?

Computing & cybersecurity

- The Bureau of Labor Statistics estimates 12% growth over the next ten years for computing graduates (50,000 ***new*** jobs per year nationally -- which doesn't account for retirements, turnover, and other openings)
- Only 50,000 U.S. students received computing bachelor's degrees in 2013
- In 2014, there were 20,884 open computing jobs in Maryland (with an average salary of $99,554), but only 2,383 CS graduates (only 21% of whom were female)
- Cybersecurity is a critical emerging need in the U.S. and Maryland
- Computing & technology are key industries that help to drive Maryland's economy

Sources: BLS, code.org, NSF WebCASPAR

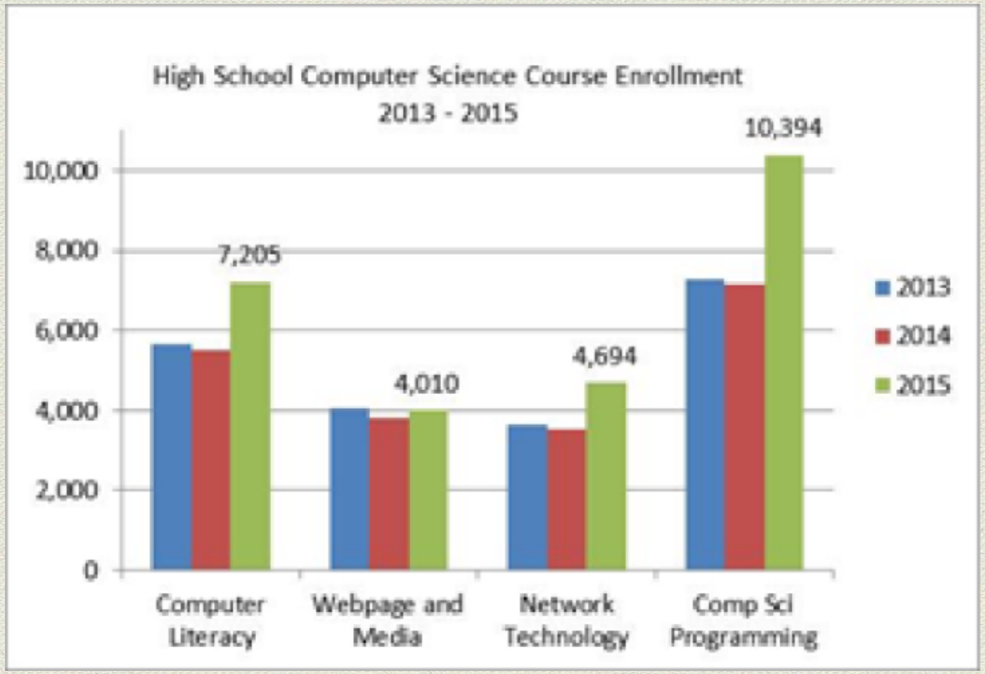
Maryland is a top producer of computing graduates

- UMBC graduated 345 students with bachelor's degrees in computing (CS, IS, BTA) in 2014 — the 6th highest of any not-for-profit university in the country
  - UMUC is the #1 producer of computing graduates nationally; UMd is #11
  - Enrollments have roughly doubled since 2007

Source: NSF

K-12 CS in Maryland

- Fewer than one-third of the 280,000 high school students in Maryland are taking CS classes, but the numbers are growing (see chart)
- Maryland AP CS A test-takers since 2008:
  - More than doubled overall (from 895 to 1935 students)
  - Proportion of female students has grown from 15% to 25%
  - Proportion of African-Americans: from 8.3% to 11% (but fluctuates)
  - Proportion of Hispanics: from 3% to 7%
  - Troubling achievement gap:
    - Overall pass rate: 64%. Women: 60%. Hispanic: 52%. Black: 26%.
    - In 2014, 115 schools (31% of schools with AP programs) offered AP CS A



Sources: MSDE, code.org

Maryland is a national leader in CS education…

- "CS Counts" as a technology education or 4th mathematics credit
- Hundreds of secondary teachers have been trained
- Thousands of students are taking CS at the high school level
- MD has the highest per capita AP CS test taking and passing rate in the country
- Maryland participated in national CS framework and standards design, and is moving towards adoption of statewide standards

Source: College Board

…but increased and sustained commitment is needed…

- Despite strong production at the college level, there are not enough graduates to meet the need
- The entire 21st-century workforce (not just computer scientists) will increasingly need to have computing skills
- Many Maryland schools (especially in minority-serving and rural areas) do not offer CS and do not have trained/certified CS teachers
- ***Funding and commitment are needed from the public and private sector***

…and underrepresentation remains a significant problem

- ***Girls and minorities are significantly underrepresented***
  - 18% of U.S. bachelor's degrees in computing are earned by women
  - 5% are earned by African Americans
  - 7% are earned by Hispanics
  - Only 30% of workers in the tech industry are women; 2% are African American; 3% are Hispanic

Source: Computing Research Associate

Some more baseline data

- Maryland is #5 in *Education Week*'s overall ranking of states for quality of public education
- But as of 2010 (last available data), Maryland was only #21 in a ranking of completeness of computer science standards
  - Not much has changed since then…
- There is no dedicated state funding for Maryland CS teacher professional development
- Maryland does have a certification pathway for CS teachers, but there are no active programs producing certified teachers

Sources: Education Week, CSTA

Who is the Team?

CS Matters in Maryland

- Co-PIs: Marie desJardins and Jan Plane
- Lead teachers: Dianne O'Grady-Cunniff and Joe Greenawalt (Charles County), Jennifer Smith (Baltimore City)
- USM leadership: Nancy Shapiro, Dewayne Morgan
- Partnership network:
  - Steering committee members (35+ from MSDE, school systems, universities, industry, and nonprofits)
  - Master teachers (dozens)
  - Maryland chapter of Computer Science Teachers Association (hundreds)
  - Summit and other event attendees (hundreds)
  - Students reached (thousands)
- National visibility through Expanding Computing Education Pathways Alliance, public presentations, published articles, upcoming national CS Education Summit in April 2017, press coverage, social media…

CS Matters Activities

- Led collaborative curriculum writing effort to create the CS Matters AP CS Principles course
  - Trained 75 teachers on inquiry-based teaching methods
- Built a statewide partnership for CS education
- Worked closely with MSDE towards creating CTE pathways, adopting CS standards, and enabling CS to count towards high school graduation requirements

What is the Plan?

MCCE scope and vision

- ***<u>Mission</u>: Expand access to high-quality K-12 computing education in Maryland for all students through teacher preparation, coalition building, and advocacy***
- Carry out innovative pedagogical research and training
- Increase awareness of CS education issues among students, parents, teachers, administrators, and the general public
- Coordinate with CS education initiatives nationally
- Assess progress and leverage the Maryland Longitudinal Data System Center

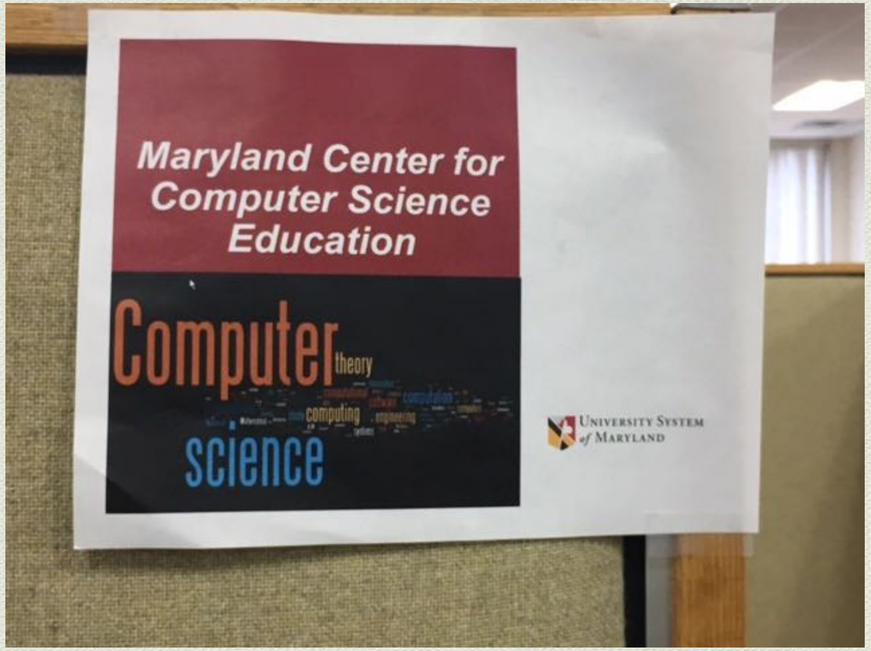
“Growing and Sustaining CS for All in Maryland” - NSF grant proposal

- Create a clearinghouse for professional development offerings and teacher preparation opportunities
- Continue to offer CS Matters AP CSP training workshops using flexible, scalable formats
- Create a credit-bearing online course on diversity in computing
- Grow and strengthen our partnership of diverse stakeholders

Upcoming activities

- Under review: College Board endorsement of CS Matters
- April 27, 2017 (CCBC): Statewide CS Education Summit
- July 8-11 (Baltimore): CSTA Annual Meeting
- July 17-28: CS Matters professional development workshop for teachers
- Multiple grant proposals in progress

Where are the Resources?



Thank you for listening!