NICE Webinar Series

NATIONAL INITIATIVE FOR CYBERSECURITY EDUCATION

Cybersecurity for Computer Science

December 7, 2016

Computer Science for All #CSforAll

December 7, 2016

A Strategy for Innovation & Competitiveness

In the coming years, we should build on that progress, by … offering every student the hands-on computer science and math classes that make them job-ready on day one.

– President Obama, 2016 State of the Union Address

1/30/16 – National Call to Action

- Historic budget proposal of 4Bn to States and 100M directly to districts
- 135M to train & support CS teachers
- 250M in commitments from industry & nonprofits
- 9 new states passed legislation to count, require and/or fund computer science education
- Chicago, New York, Arkansas, Rhode Island committed to provide CS classes for all students
- 27 Governors write open letter to Congress in support of Federal education funding for computer science

Nationwide Year of Action & Momentum

#CSforAll

500+
Organizations answered the President's call to action

15
Agencies and departments participating in the NSTC FC-STEM IWG for CSforAll

14
States took action to expand CS (32 now count as grad. requirement)

27
Governors (13 Rs) in support on more CS funding

45M
in NSF grants and competitions to support teacher preparation

300
organizations joined the CSforAll Consortium

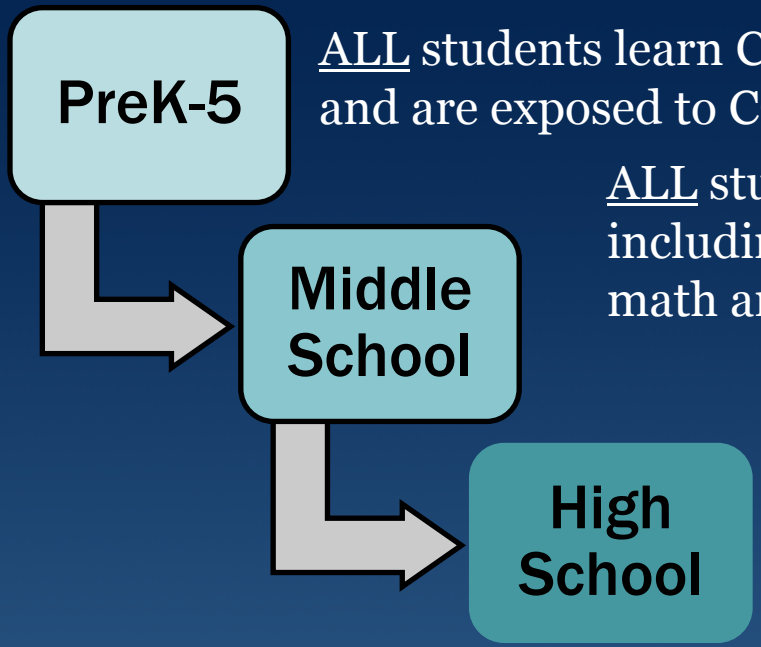
CSforALL
CONSORTIUM

3000+
Schools signed the CSforAll K-12 Pledge

45K
Teachers prepared in elementary, middle, HS

25K
Students in 2,000 classrooms enrolled in new AP CS Principles

Vision for CSforAll



ALL students learn COMPUTATIONAL THINKING skills and are exposed to COMPUTER SCIENCE concepts.

ALL students experience COMPUTER SCIENCE including PROGRAMMING (integrated into math and other subjects, or standalone courses).

ALL students have access to rigorous COMPUTER SCIENCE courses and more students will opt-in to specializations such as:

- App/Game development
- Cybersecurity
- Programming
- Networking

Areas of Opportunity

– CSforAll:RPP solicitation open now, $20 million to support K-12 CS teacher preparation from NSF

– US Department of Education resources: http://innovation.ed.gov/what-we-do/stem/computer-science-for-all/

–Join CSforAll Consortium (www.csforall.org)

Thank you

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June 22, 2016

Q&A

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Cybersecurity and Computer Science Synergy

Cybersecurity for Computer Science Webinar

December 7, 2016

Tammy Pirmann

Deborah Seehorn

Mark Nelson, Ph.D., MBA, CAE

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Why CS Education in K-12? Meet Maria…

- 1 in 10 High Schools do not offer computer science
- 40% of states do not count computer science toward graduation
- In 2013, there were 2 states where no women took the AP CS Exam; no Hispanic student in 8, and no African American student in 13.
- Many of the highest paying and highest job satisfaction positions are in CS Fields.
- 49% of all open STEM positions are in CS fields.
- More than 90% of K-12 CS teachers have not had a college-level CS course.

Continuing Professional Development (CPD) Pipeline Project

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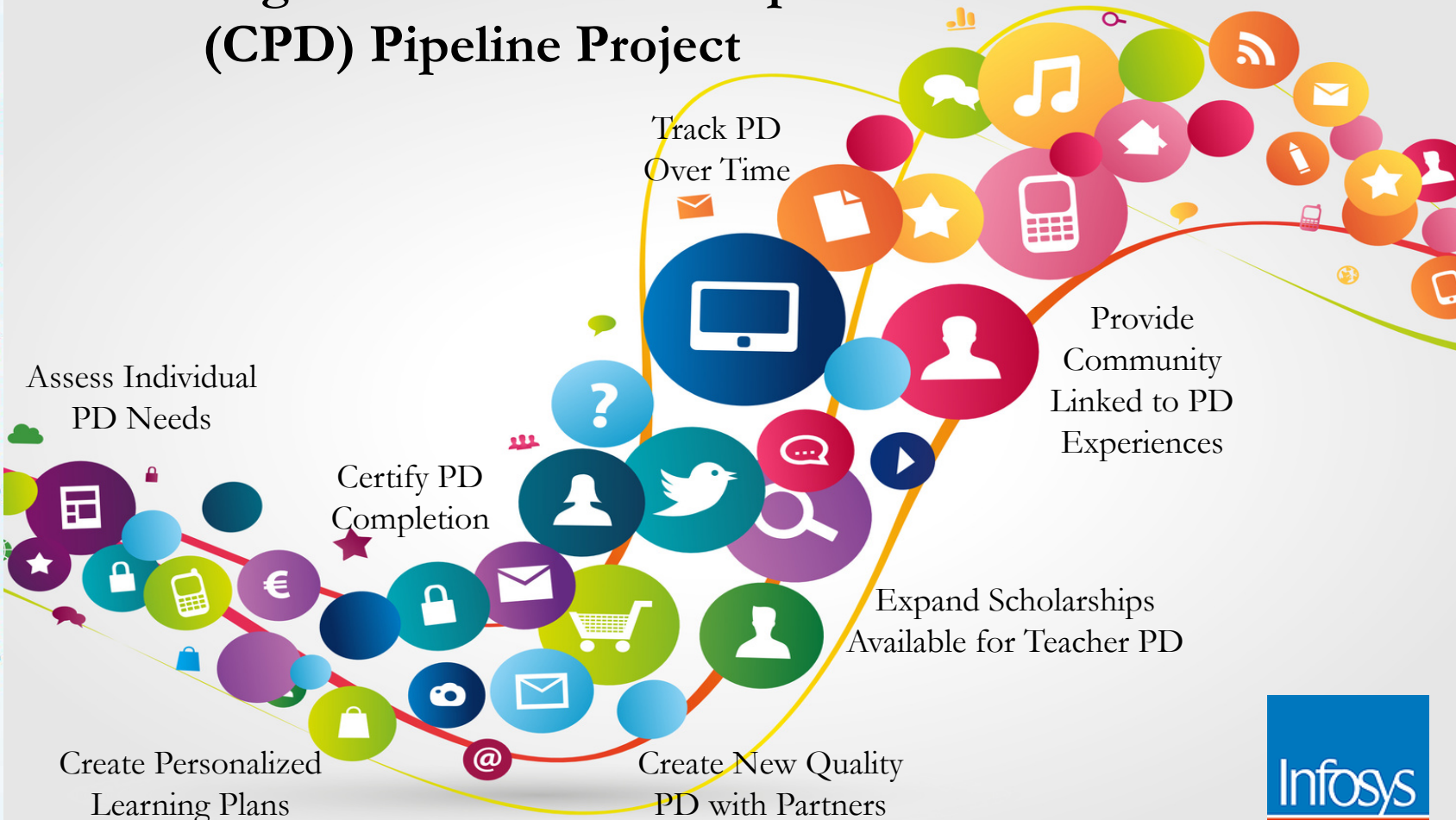

Infosys FOUNDATION USA

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CYBERSECURITY

1 NSA Day of Cyber

2 CYBER TEACHER

3 CISOs 4Teachers

Corporate Sponsorships

Infosys Foundation USA/ACM/CSTA Awards for Teaching Excellence in Computer Science

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- We will award up to ten (10) awards of $10,000 each to K-12/pre-university computer science teachers.
- Awards will be announced this week.
- Further information at this site: http://www.csteachers.org/page/CSTeachingAwards

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CSforALL

CONSORTIUM

The CSforAll Consortium is a national organization formed in response to the growing CS education community, the broadly bipartisan support for computer science, and the President's call to action to provide every student with access to CS.

CSforAll.org

The CSforAll Consortium website provides searchable access to resources and the means to discover and contact relevant partners, and tracks the impact of CSforAll initiatives across the country.

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Consortium Members

CSforAll.org

301
Approved Members

144
Content Providers

70
LEAs (States/Districts) or Aggregate Ed Groups (ECEP)

87
Funders/Supporters of CS Education

196
Members with Profiles

107
Members with K-5 Content

29
States Represented by Education Associations

125
Informal Education Members

Q&A

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CSTA Announces Revised Interim Standards

CSTA Video

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2016 Interim
CSTA K-12 Computer Science Standards

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Vision

The **CSTA** created and published national K-12 CS standards of computer science learning objectives to guide/inform teachers and administrators in the design and implementation of CS activities integrated in the curriculum and as stand-alone courses….

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CSTA Standards Revision Principles

1. **For teachers, by teachers**
   (grounded in teachers' experiences)
2. Informed by research
   (aligned with student development)
3. Takes into account college and career readiness
4. **For all students** - broadening participation
5. A step towards something more
   (considers evolving landscape)

CSTA K-12 CS Standards Revision Task Force

- **Educators with diversity of experience**
  - Three K - 5 classroom CS educators
  - Three 6 - 8 classroom CS educators
  - Three 9 - 12 classroom CS educators
  - One community college CS educator
  - One university CS educator
  - One district-level CS educator (co-chair with K-12 expertise)
  - One state-level CS educator (co-chair with 6 - 12 expertise)
  - CSTA COO and CSTA project manager
- **Reviewers from various states and local school systems**

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CSTA Standards Revision Process

- **Gap analysis** (CSTA K-12 CS standards 2011 vs. Framework concepts/practices)
- **Evaluate and update** standards in 2011 CS standards
  - Is the standard **still appropriate**? (or more appropriate for IT/Ed Tech standards?)
  - Is the standard appropriate for a different level? (e.g. Move from middle school to elementary school)
  - Is the standard at the appropriate level of **Revised Bloom's Taxonomy**?
  - Is the standard **measureable**?
  - Remove, rewrite, reposition as necessary

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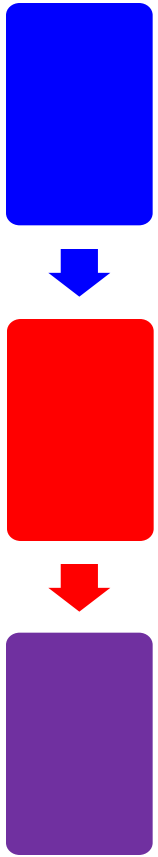
CSTA Standards Revision Process
Continued

- Consider **new standards** in areas not included in 2011
- Respond to / incorporate **input/feedback** on 2011 standards
- Check for **alignment with K-12 CS framework** statements
- Develop **progressions** from ES-MS-HS that reflect framework statements



Concept + Practice = Standard

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Concept		Practice		Standard (performance)
Programming and Algorithms By the end of 2nd grade… A program can be created by selecting instructions from a set of commands and inputting them into a computer as a sequence.	+	Collaboration By the end of 2nd grade... Work cooperatively and collaboratively with peers, teachers, and others using technology.	=	Programming and Algorithms (1st grade) Work collaboratively in clear roles (e.g., pair programming) to construct a problem solution consisting of a sequence of programming commands (e.g., block-based).

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Where is Cybersecurity Education in the CSTA K-12 CS STANDARDS?

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Cyber safety standards in K-8

- Use passwords to protect private information and discuss the effects of password misuse. (K-2)
- Create examples of strong passwords, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords. (3-5)
- Explain problems that relate to using computing devices and networks (e.g., Logging out to avoid others from using your account, cyberbullying, privacy of personal information, and ownership). (3-5)
- Summarize security risks associated with weak passwords, lack of encryption, insecure transactions, and persistence of data. (6-8)

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Cybersecurity standards in grades 9-10

- Compare and contrast multiple viewpoints on cybersecurity (e.g., From the perspective of security experts, privacy advocates, the government). (9-10)
- Explain the principles of information security (confidentiality, integrity, availability) and authentication techniques. (9-10)
- Use simple encryption and decryption algorithms to transmit/receive an encrypted message. (9-10)
- Identify digital and physical strategies to secure networks and discuss the tradeoffs between ease of access and need for security. (9-10)

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Cybersecurity standards in grades10-11

- Explain security issues that might lead to compromised computer programs. (Ex. Circular references, ambiguous program calls, lack of error checking and field size checking). (10-11)
- Explore security policies by implementing and comparing encryption and authentication strategies (e.g., Secure coding, safeguarding keys). (10-11)

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CS Standards – A foundation for cybersecurity education

- Identify, using accurate terminology, simple hardware and software problems that may occur during use. (e.g., App or program not working as expected, no sound, device won't turn on, etc.) (K-2)
- Model how a computer system works. Clarification: only includes basic elements of a computer system such as input, output, processor, sensors, and storage. (3-5)
- Model how a device on a network sends a message from one device (sender) to another (receiver) while following specific rules. (3-5)

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CS Standards – A foundation for cybersecurity education

- Use a systematic process to identify the source of a problem within individual and connected devices (e.g., Follow a troubleshooting flow diagram, make changes to software to see if hardware will work, restart device, check connections, swap in working components). (6-8)
- Describe ethical issues that relate to computing devices and networks (e.g., Equity of access, security, hacking, intellectual property, copyright, creative commons licensing, and plagiarism). (6-8)
- Simulate how information is transmitted as packets through multiple devices over the internet and networks. (6-8)

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CS Standards – A foundation for cybersecurity education

- Deconstruct a complex problem into simpler parts using predefined constructs (e.g., Functions and parameters and/or classes). (9-10)
- Illustrate the basic components of computer networks. (e.g., Draw logical and topological diagrams of networks including routers, switches, servers and end user devices, create model with string & paper.) (9-10)
- Develop criteria to evaluate the beneficial and harmful effects of computing innovations on people and society. (11-12)
- Simulate and discuss the issues (e.g., bandwidth, load, delay, topology) that impact network functionality. (e.g., Use free network simulators) (11-12)

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CSTA K-12 CS Standards Revision 2017

- **CSTA Task Force Members**

  (majority continue from 2016)
  - Four and ½ K-5 Members
  - Three and ½ 6-8 Members
  - Five 9-12 Members
    - One Community College
    - One University
  - Co-Chairs Continue
  - CSTA COO Continues

- **Goals for the 2017 Task Force**
  - Check for alignment with 2016 K-12 CS Framework released in October
  - Indicate Cross-curricular Connections
  - Indicate Cyber Safety Standards
  - Indicate Cyber Security Standards
  - Prepare a Glossary of Key Terms

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Please visit the CSTA website for a PDF copy of the 2016 CSTA interim K-12 computer science standards.

http://www.csteachers.org/CSTA_Standards

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Questions?

Thank You!

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The Association for Computing Machinery founded CSTA as part of its commitment to K-12 computer science education.

Q&A

Thank You for Joining Us!

Upcoming Webinar: "Cybersecurity Games: Building Tomorrow's Workforce"

When: Wednesday, January 18, 2017 at 2:00pm EST

Register: **https://nist-nice.adobeconnect.com/webinar-jan2017/event/event_info.html**

nist.gov/nice/webinars

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