CE21-Maryland Summit for Computing Education: A Call to Action

Marie desJardins, Susan Martin, and Penny Rheingans
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Welcome!

Today’s goals:

- **Share** information about the state of CS education in Maryland and nationally
- **Examine** specific paths for improving curriculum and increasing quality of CS education
- **Develop** recommendations for action

Today’s participants:

- **58 teachers** from 11 Maryland school systems, four private schools, and two Pennsylvania school systems
- **20 administrators** from 9 school systems, one private school, and MSDE
- **34 industry/government/nonprofit professionals** (NSF, ACM, ABET, Lockheed Martin, Orbis, Cisco, Microsoft, Harris, NAF, Next Century, CSTA, DoD, NSA, NIST, .......)
- **19 faculty/staff/students** from 15 community colleges and universities
Summit Team

- CE21 staff (yellow ribbons)
  - PIs: Marie desJardins, Susan Martin, Penny Rheingans
  - Students: Rebecca Chhay, Shelby Clarke, Shawn Squire, Abigail Williams

- Student panelists (green ribbons)
  - Beatrice Garcia, Anastasia Iljina, Alex Markowski, Blossom Metevier, Khai Nguyen, Maxwell Weinberg

- Lunchtime speakers (green ribbons)
  - Rick Adrion, Mark Guzdial

- Session presenters (blue ribbons)
  - Dianne O’Grady-Cunniff, Chris Stephenson, Mark Wolkow, Pat Yongpradit
Logistics

- **Schedule**
  - Student panel (UC Ballroom – this room)
  - Two parallel sessions (UC Ballroom Lounge and UC 312)
  - Lunch panel (UC Ballroom)
  - Three parallel working sessions (check your badge! – UC 310, UC312, UC Ballroom Lounge)
  - Plenary wrapup (UC Ballroom)

- **Facilities**

- **Resources** – table in back of room

- **Evaluations** – overall evaluation and individual sessions – please leave in box at registration table

- **Teacher stipends** – turn in form *before you leave* to Susan or another organizer
CS Education: A National Crisis

- We need many trained computer scientists
  - There will be more new jobs in computing than in all other areas of STEM combined

- We are not producing enough computer scientists
  - Enrollment in computing majors dropped dramatically in the 2000s
  - Recently, enrollments have increased dramatically (20% more CS degrees awarded in 2012 than in 2011! -- but still may not be enough)
  - Retention and student preparation continue to be major issues

- Our pool of computer scientists is not sufficiently diverse
  - Women, African-Americans, and other ethnic minorities choose CS at a much lower rate than white males

- We need more highly qualified K-12 CS teachers

- We need a strong K-12 CS curriculum
CS is Not Just Programming and Video Games!

- Stereotypical view of CS:
  - CS is mostly about programming
  - The part that isn’t about programming is about video games and hacking
  - The typical computer scientist is an asocial, nerdy, young white male who likes to play video games and works all alone in a cubicle all day
  - CS isn’t a good career for someone who wants to make a difference in people’s lives
Interdisciplinary Diversity of CS

- CS is inherently mathematical
- CS is directly related to engineering
- CS connects to the visual arts
- CS applications often help to solve and model scientific problems and societal challenges
- Building CS systems requires understanding human behavior
- Computer science lies at the boundary between mathematics, science, and engineering, and helps us to understand, interact with, and control the world around us
Challenges in K-12 Curriculum

- In most states (including Maryland!):
  - Very few of the CSTA-identified K-12 CS standards are part of the standard curriculum*
  - **Computer science classes are not required** for graduation, and in most cases **don’t count** towards any graduation requirement
  - Many schools don’t offer computing courses beyond the level of keyboarding skills, and even fewer offer college preparatory CS courses

* CSTA data on Maryland standards: 31 out of 35 Level I standards; 3 out of 10 Level II standards; 1 out of 10 Level III standards.
Challenges in Teacher Preparation

- In most states (including Maryland!):
  - Certification requirements are unclear
  - Certifications often do not meet the needs of the discipline
  - CS classes are often taught by teachers without CS certification
  - There is inadequate in-service professional development for CS
What UMBC is Doing

- **CE21: Maryland** (funded by NSF)
- **Artemis** (summer camp for rising 9th grade girls)
  - [https://sites.google.com/a/umbc.edu/the-artemis-project-umbc/](https://sites.google.com/a/umbc.edu/the-artemis-project-umbc/)
  - Funded by NSF and the Silicon Valley Community Foundation
- **“Computational Thinking 101”** (NSF-funded design-based intro course for first-year computing majors)
- **ACTIVE Center** (active learning classroom)
  - Funded by the Hrabowski Academic Innovation Fund, BAE, and Northrup Grumman
- **CS4HS** summer workshops (funded by Google)
- Proposed **BS/MAT** program (under development)
- Planned larger **professional development** summer program (under review by NSF’s CE21 program)
What You Can Do

**Today:**
- *Meet* new people and share ideas
- *Ask* questions, listen, and learn
- *Discover* new resources

**After the summit:**
- *Share* what you have learned here with your colleagues
- *Join* CSTA and your local CSTA-Maryland chapter
- *Learn* about national standards (CSTA)
- *Emphasize* teamwork, computational thinking, and real-world applications in your classes
- *Think* about ways to increase diversity in your classes
- *Ensure* that your school has a Tech Ed course with CS content
- *Lobby* to offer the new CS Principles class in your school
- *Help* us work towards statewide credit for CS as a math or science class