

CE21-Maryland Summit for Computing Education: Event Outcomes and Next Steps

Marie desJardins, Susan Martin, and Penny Rheingans
Department of Computer Science and Electrical Engineering
University of Maryland, Baltimore County
February 17, 2014

Executive Summary: The CE21-Maryland planning project, supported by NSF's Computing Education for the 21st Century (CE21) program, began in March 2012 and led up to a Summit for Computing Education in May 2013. This one-day event was attended by 125 high school computer science teachers, state and local education administrators, industry representatives, and college faculty. The summit included presentations, panels, and discussion intended to increase participants' knowledge of issues associated with computer science education in Maryland and nationally. Evaluation data collected from attendees showed that the event increased participants' knowledge of local and national issues and increased their commitment to improve high school computer science education in Maryland. Summit participants also shared their thoughts about long-term options for awarding high school credit for computer science classes and short-term ideas for increasing the diversity of students enrolled in computer science classes. The information and data gathered at the summit are informing ongoing efforts led by UMBC to educate educators, high-school students, parents, and business representatives about the importance of computer science education and to improve high school computer science offerings in Maryland.

CE21-Maryland Project Overview: CE21-Maryland (NSF award CNS-1160624) is focused on two main activities: (1) gathering data about the status of CS education in Maryland high schools and (2) building relationships among high school teachers, community college and university faculty, and state education administrators to facilitate and increase state-level support for lasting improvements to computing education. CE21-Maryland began in March 2012. An online survey of Maryland high school computer science teachers was conducted in May 2012 and a computer science education mini-summit was held at UMBC for 50 teachers, faculty, and administrators in August 2012. An advisory board—composed of high school teachers, MSDE administrators, and community college and university faculty—was also formed. Advice from the advisory board and information gathered at the 2012 mini-summit informed the structure and content of the focal activity of the project: the CE21-Maryland Summit for Computing Education, a day-long workshop held on May 17, 2013, at UMBC. This report describes the summit content and summarizes the outcomes of the event based on evaluation data collected. We have also included some recommended next steps based on information gathered during the summit, on the evaluation forms, and during the advisory board meeting held immediately after the summit.

Details about the specific activities and outcomes of the CE21-Maryland project through

December 2012 are presented in detail in a 2012 executive report¹ and in an article in the 44th ACM Technical Symposium on Computer Science Education (SIGCSE-13).²

CE21-Maryland Summit for Computing Education: The summit was a day-long, statewide leadership summit on computer science education held at UMBC on May 17, 2013. The event brought together 125 stakeholders, including high school teachers and administrators, MSDE administrators, industry representatives, computing association leaders, and Maryland college faculty. The summit’s content was intentionally aligned with the goals and activities of the CE-21 Maryland project. Specifically, the summit was structured to: (1) increase participants’ knowledge about the state of computer science in Maryland, national issues related with computer science education, and computing education resources, and (2) build relationships and support and momentum for long-term improvements to high school computer science education in Maryland.

In mid-January 2013, the CE21-Maryland Advisory Board met to make suggestions about the content and format of the summit. Immediately following the board meeting, the research team—composed of the PIs and student staff—began marketing the event on the project website and with a “save the date” postcard that was mailed to approximately 400 teachers, administrators, and industry professionals in the CE21-Maryland contact database. Online registration began on February 1, 2013. To encourage as many participants as possible, there was no fee for the event and teachers were eligible for a \$35 stipend to offset the cost of travel to the event. A series of four emails and reminders were sent to individuals in the CE21-Maryland contact database and on the CSTA-Maryland listserv. Additional emails were also sent by CSTA’s national office to its members with Maryland addresses. The UMBC Office of Institutional Advancement and the Center for Women in Technology sent information to their industry contacts.

There were a total of 125 registrants for the 150 available spaces at the summit. The registrants included 53 teachers, 13 K-12 administrators, 14 faculty members from 2- and 4-year institutions in Maryland, 14 industry representatives, and 28 who designated their role as “other” on the registration form (these included MSDE administrators, association leaders, students, and foundation professionals). The teachers and administrators were from 11 of the 24 public school districts in Maryland, one Pennsylvania jurisdiction, and seven private high schools: six in Maryland and one in Philadelphia. The Maryland public school districts represented were Anne Arundel, Baltimore City, Baltimore County, Caroline, Charles, Howard, Montgomery, Prince Georges, Queen Anne, St. Mary’s, and Worcester. Industry representatives included professionals from Harris Corporation, Booz Allen Hamilton, Johns Hopkins Applied Physics Lab, National Security Agency, NIST, Next Century Corporation, Microsoft, and Lockheed Martin Corporation. There were also registrants from ACM, the National Academies Foundation, CSTA, AIR, and ABET.

The program opened with welcome remarks by Dr. Marie desJardins, CE21-Maryland’s lead PI, and Dr. Philip Rous, UMBC’s Provost, followed by three program sessions, a lunch panel, and a closing discussion about future change and next steps. The program sessions included a student panel and two other sessions with two simultaneous presentations from which

¹ *CE21-Maryland: Rebooting Computing Education in Maryland High Schools*, available at <http://ce21maryland.umbc.edu/resources/>.

² *CE21—Maryland: The State of Computer Science Education in Maryland High Schools*, available at <http://ce21maryland.umbc.edu/resources/> and in the ACM Digital Library.

attendees could select. The program topics included sessions on national issues (presented by Chris Stephenson, CSTA Director), sessions on how to integrate computing topics into Maryland's required Technology Education courses and on the new AP CS Principles Course (led by teachers Dianne O'Grady-Cunniff and Pat Yongpradit) and a session on the Maryland demand for computing graduates (led by Mark Wolkow of the National Security Agency). Drs. Mark Guzdial and Rick Adrion, from the NSF-funded *Georgia Computes!* and *CAITE* projects, respectively, shared their perspectives about changes that have occurred in computer science education in Georgia and Massachusetts. The day concluded with a group discussion, facilitated by Dr. desJardins, with all of the attendees about future directions and next steps. Notes were taken and transcribed by the students on our research team. A copy of the event schedule, with links to the session materials is included in Appendix A and is also available on the CE21-Maryland website: <http://ce21maryland.umbc.edu/ce21-maryland-spring-2013-summit/>.

Summary of Summit Evaluation Data: Attendees were given copies of an evaluation form for each individual session as well as an overall event evaluation form in the folders they received when they checked in to the event. During the opening remarks, at lunch, and then at the end of the final session in the program, attendees were reminded to fill out the evaluation forms. Sixty-six participants completed session evaluations and 44 completed the overall event evaluation, which asked about specific outcomes related to participating in the event. The responses to the items on the session and event evaluation forms were tabulated by our student research team and are available as Appendices B and C of this report.

Session Evaluations: Attendees were asked to respond to three four-point Likert-scale items about each session that asked whether the session (1) increased awareness and knowledge about national and/or state issues and (2) expanded knowledge and skills for delivering computer science courses. They also were asked to assign an overall rating of Excellent (5), Good (4), Fair (3) or Poor (2). Attendees were also asked three open-ended questions about the most important thing they learned in the session, what actions they planned to take as a result of the session, and how the session might have been improved.

The program sessions received high ratings overall. All of the sessions received ratings above 4.50. Each session was rated with fairly equal numbers of Excellent and Good ratings, except for the session about national issues (presented by Chris Stephenson, Executive Director of CSTA), which received nearly three times as many Excellent as Good ratings. The responses on all of the sessions suggest that attendees increased their knowledge at the sessions. All sessions had average ratings of 3.00 or higher on the item related to increasing knowledge. The sessions about national computer science education issues (3.84), updates about the AP CS Principles course (3.59), and the lunch panel about Georgia and Massachusetts initiatives to improve computer science education (3.54) had the highest average ratings on the item about increasing knowledge. Most of the sessions, however, had low ratings (< 3.00) related to expanding knowledge and skills. The only session to receive an average rating greater than 3.00 on this item was the AP CS Principles update (3.21). These ratings make sense within the context of the primary goals of the summit, which were increasing knowledge and building relationships for long-term improvement of computer science education in Maryland, rather than in building specific skills.

A review of the open-ended comments associated with the sessions shows that Summit attendees increased their knowledge about the variation and availability (or lack thereof) of CS

preparation and experiences in Maryland high schools. They also gained information about how to fit CS topics into the Foundations of Technology courses and valued the update about the new AP CS Principles course. Most comments about intended actions revolved around seeing the importance of computer science education for students and using the information and resources they learned in the sessions to have informed conversations with colleagues and administrators. The open-ended responses also revealed that attendees intended to increase their efforts to promote CS to students at their schools. Comments from the last session about Future Directions and Change showed that the summit allowed attendees to see the complexity of the issues associated with this topic and the perspectives of multiple stakeholders. While some comments from this session confirmed attendees' commitment to contributing to a change, there was also confusion and frustration communicated about exactly what should be done to change the current situation.

Event Evaluation–Participant Outcomes: The overall event evaluation was constructed around the overarching outcomes of increasing knowledge and building commitment for long-term improvement to computer science education. Three multi-stem 5-point Likert-scale items (5=A lot, 1=Nothing/Not at all) were included on this evaluation form. The first question asked about the attendees' knowledge and commitment to improving computer science education before the Summit. The responses to this first item show that the participants came to the summit highly motivated to increase student awareness of CS (4.79) and to collaborate to improve CS education (4.70). The group also came with limited knowledge of resources (3.19) and knowledge (3.63) about the current state of CS education in the state and the CE21-Maryland project (2.91).

The second item asked about the effect of the summit on attendees' knowledge of national issues and resources, and on their ability to educate and talk with others. This item also asked about the impact of the summit on the attendees' personal network and their ability to identify others to work with to improve computer science education. All of these items had average ratings of 4.2 or higher. The summit had the most impact on attendees' knowledge of the CE21-Maryland project (4.63), national initiative to improve computer science education (4.60), and interest in future events related to CS education in Maryland (4.76). However, summit attendees self-reported slightly less impact on their abilities to educate others or on their personal networks (4.20 and 4.21, respectively). These averages are the self-reported perceptions at the end of the conference; therefore, attendees had not yet had the opportunity to engage in followup conversations about what they learned, nor had they had opportunities to reach out to other attendees using the contact list that was provided in their folders.

The final Likert item (5= Increased a Lot, 1=Decreased a Lot) asked about changes to attendees' commitment levels and willingness to implement various changes. All six of these sub-items had average ratings of 4.5 or greater. Attendees' willingness to talk with leaders in their organization had the highest average rating (4.58), followed by their commitment for increasing student interest in CS in Maryland high schools (4.55). The overall evaluation suggests that attendees came to the summit already motivated and willing to collaborate with others for change, and that the experience increased their overall knowledge of issues and their willingness to take action to improve CS education in Maryland. These three items were followed by two open-ended questions asking the most important things learned and what actions would be taken. The responses were similar to those on the evaluation of the sessions. Respondents reported that they learned about valuable resources and information about the new

CS Principles course. Others said that the most important thing they gained was an understanding of the issues associated with CS in Maryland. The majority of the comments about what the attendees will do were related to sharing information that they learned, especially with other teachers, school and county administrators, and their school principal.

Future Changes Discussion: The final session of the day was a structured discussion activity designed to gather advice and suggestions from summit attendees about how to expand and improve computer science education for Maryland high school students, especially those from underrepresented groups. Attendees were divided into three small groups that met in different rooms for 30 minutes to discuss three questions:

1. Computer science courses currently fulfill an elective in Maryland. From your perspective, what if any other type of graduation requirement should computer science courses fulfill?
2. What long-term steps should be taken to change how computer science is offered and “counted” in Maryland? Be as specific as possible.
3. What high-impact, low-cost things could easily be changed in your school, school system, or organization to dramatically increase the number and diversity of high school students taking computer science courses?

The discussions were facilitated by the project PIs (Drs. desJardins, Martin, and Rheingans). Each group also had an advisory board member assigned as a co-facilitator and a student note taker. After the small group discussions, the attendees came back together to hear summary reports of the ideas shared in the breakout sessions and for open discussion about next steps that should be taken. Notes were also taken in this large discussion session.

The group discussions did not result in complete consensus about what type of graduation requirement (if any) that computer science courses should fill. All three small discussion groups recognized that while it would be ideal to have computer science course fulfill a unique requirement, math credit is probably the easiest route, since this strategy is permissible under current MSDE policies. However, questions were raised about how this would work for students preparing for college entrance and whether CS courses could be double-counted. There was also discussion about how computing already appears in parts of the Common Core Standards and Curriculum and about which CS topics could be included across various curricula. Finally, some attendees maintained that CS should be permitted to count as the required Technology Education course.

Attendees presented a variety of responses that fell into a few broader themes in response to the second question, which asked about long-term steps that are needed to improve computer science education. The first theme that emerged was that the importance of high school computer science must be clearly articulated to stakeholders—parents, students, local and state administrators, and business leaders. Collaborations and partnerships among high schools, colleges and universities, and businesses are needed to facilitate long-term changes. In addition, the pros and cons of including computer science as a high school graduation requirement must also be articulated to these constituencies. In addition, attendees thought that there needs to be a Maryland computer science curriculum that is relevant and energizing, so that the breadth of the discipline and connection to important challenges facing our society is presented to all students. Some suggested topics to be included were robotics, mobile applications, and security. Finally, the discussion included the need for teacher preparation and ongoing professional development.

The final question posed in the discussions asked participants to identify short-term, low-

cost initiatives that could be implemented locally to increase the diversity of high school students enrolled in computer science courses. Attendees thought that career counseling and high-profile speakers could be implemented to introduce students to computer science. The groups also thought that college students might be invited to speak to current students about their majors, career choices, internships, and college experiences. Another idea was to work with groups already in place that promote the success of underrepresented groups. Women and underrepresented minorities could be sent invitations to events where they could learn more about the fields, careers, and courses offered at the high schools. Finally, restrictions on who can take CS courses should be removed so that any student can enroll in AP CS, not just those in magnet programs.

CE21-Maryland Post-Summit Board Meeting: A meeting was held immediately after the summit wrap-up session ended at 3:30 PM. This meeting was attended by Marie desJardins (PI), Susan Martin (CoPI), Kara Lynch (BCPS), Mark Guzdial (*Georgia Computes!*), Sharon Kramer (HCPSS), Chris Morris (CSTA-MD), Pat Yongpradit (formally of MCPSS, currently with code.org), Chris Stephenson (CSTA), Dianne O’Grady-Cunniff (Charles County PS), and Jan Plane (UMCP). The purpose of the meeting was to discuss next steps and suggestions going forward. Dr. desJardins began by describing the proposal she and her research team (Jan Plane, Pat Yongpradit, Chris Morris, and Dianne O-Grady-Cunniff) had submitted to NSF to develop a Maryland curriculum for the CS Principles course using a professional development model. (This proposal was funded and the project (CS Matters in Maryland, NSF #1339265) began in January 2014.) A number of strategies for gaining support for computer science education were discussed by the group, including working with the math coordinators to generate a list of contacts to talk about the project, working with MSDE to develop and implement a day-long training event for principals, and requesting meetings with each of the county superintendents. Contacts with principals and superintendents should include information about the proposed CS Principles AP course and information about the number of MD students taking AP CS A by school district. It was also suggested that teachers (and CSTA-Maryland) could ask for time on the agenda for their local school boards to do a presentation and Q&A session. Finally, board members suggested that members of the CE21-Maryland research team pursue getting on the agenda of the Maryland Association of Boards of Education (MABE) in the fall and also explore how they might present or have a table at the Maryland State Education Association (MSEA) meeting held annually in October.

Post-Summit and Ongoing Activities: Since the summit, UMBC has continued to engage actively with the Maryland K-12 community to improve the quality of CS education in Maryland high schools. We have received a CS10K award (jointly with the University of Maryland, College Park) to support our new “CS Matters in Maryland” initiative, which will develop a Maryland-specific curriculum for CS Principles and train both master and apprentice teachers to teach the new course over the next three years.

Maryland is making rapid progress towards code.org’s “CS Counts” goal. Through a partnership between code.org, UMBC, UMCP, the Computing Research Association, MSDE, and Governor O’Malley’s office, new legislation has been introduced to count designated CS classes as a 4th math class towards high school graduation requirements. Discussions are ongoing about which courses should count, and how such courses will be considered by University System of Maryland institutions during the college admissions process.

We are continuing to pursue outreach activities to young women to encourage them to consider computing as a career or interest area. In Summer 2013, we offered the 5-week Artemis summer camp for rising 9th grade students, in partnership with Brown University, who created the Artemis program with NSF funding. This year, we are planning a one-day event at UMBC on May 3, 2014, for 75 10th and 11th grade girls and their parents, with hands-on activities and workshops on computing-related topics.

UMBC is continuing to work towards the creation of a teacher certification program for new and in-service teachers. Creating certification pathways has become increasingly critical as UMBC continues to see increasing enrollments in computer science at the undergraduate level: this increased interest, which reflects recent national trends, is leading to greater pressure at the high school level to offer high-quality CS courses, taught by highly qualified teachers. One step that we have taken at UMBC to move in this direction is the creation of a CS Education interest group, which currently has 71 members (students, faculty, and staff).

Summary and Next Steps: The summit was a successful and effective focal event for the CE21-Maryland planning project. The event content was aligned with the project's two primary activities: (1) gathering information about the state of high school computer science education in Maryland and (2) building support for its long-term improvement. The summit raised the visibility and importance of computer science education for students in Maryland. Summit participants reported increases in knowledge about national and local issues related to high school computer science education. More specifically, the session evaluations showed that attendees gained valuable information about the new AP CS Principles course and other computer science resources. The event evaluations also showed that participants reported increases in their commitment and willingness to work to improve high school computer science education in Maryland. Attendees said that they were going to take the information that they learned and share it with fellow teachers, administrators, and parents. They also said that they would take action to increase student knowledge and interest in computing. The summit accomplished its intended outcomes of increasing knowledge and building support for long-term change.

There is much work remaining to improve computer science education and to create opportunities for all students to be introduced to basic computational thinking skills in Maryland. The responses to the open-ended questions on the evaluations and the notes from the Future Changes discussion session and the wrap-up session show that there is not consensus on what type of credit should be given for computer science classes, with multiple options under consideration. The attendees also expressed their thoughts about the need for an engaging, relevant, and "more than just programming" Maryland computer science curriculum, improved teacher preparation, and more professional development opportunities for current teachers.

Change is a process that takes time and intentional, focused effort. In our 2012 executive report and 2013 SIGCSE paper, which described survey data and community building activities conducted in the first six months of the project, we identified four concrete recommendations to focus the CS education community's efforts in Maryland:

1. Continue to grow the computer science education network in Maryland.
2. Educate the broader community about the CS education crisis.
3. Increase the availability of high-quality CS courses for all Maryland high school students.

4. Provide effective professional development opportunities and develop certification programs to expand the number of highly qualified high school CS teachers.

The summit expanded the computer science education network in Maryland and educated the broader community—the 125 summit attendees, as well as their colleagues across the state with whom they will share information about the need for computer science. The summit also affirmed the need to provide effective professional development opportunities to high school CS teachers so that they are prepared to deliver high-quality courses and the new AP CS Principles curriculum. The CS Matters in Maryland project is developing a curriculum for the AP CS Principles course for Maryland high school computer teachers that is centered around inquiry-based learning, incorporates Common Core mathematics and writing standards explores the breadth of the discipline and computing careers, and uses engaging relevant examples while teaching core computational thinking concepts that prepare student for additional computer science coursework. The project will use a master/apprentice teacher approach to prepare teachers from around the state over a three-year period. Finally, the post-summit board meeting discussion included a number of concrete steps for further educating teachers and administrators about the CS education crisis and the importance of computer science for all high school students. Our ongoing activities are resulting in greatly increased student interest, increased commitment to CS courses and teachers by the school districts, and enhanced statewide support for high-quality CS education in all Maryland high schools.

Appendixes:

Appendix A: Summit Schedule

Appendix B: Session Evaluation Data

Appendix C: Event Evaluation Data: Participant Outcomes

Appendix A: Summit Schedule

<i>Time</i>	<i>Session</i>	<i>Location</i>
8:30 — 9:00 AM	Check-in / Light Refreshments	UC Ballroom
9:00 — 9:30 AM	Welcome & Context for the Day Facilitated by Dr. Marie desJardins , UMBC Professor [PDF] Featuring: Dr. Philip Rous , UMBC Provost	UC Ballroom
9:30 — 10:30 AM	Session 1: College Student Panel Facilitated by Dr. Penny Rheingans , UMBC Professor Panelists: Beatrice Garcia '16, Alex Markowski '13, Blossom Metevier '16, Khai Nguyen '14, Anastasia Ruffino '16, Max Weinberg '15	UC Ballroom
10:30 — 10:45 AM	Break — Refreshments	UC Ballroom
10:45 — 11:30 AM	Session 2a: Getting Computing into Tech Ed Courses by Example Facilitated by Dianne O'Grady-Cunniff , Westlake HS, Charles County [PDF] <i>OR</i> Session 2b: Computer Science Education: What You Should Know About this National Imperative Presented by Chris Stephenson , CSTA Executive Director PDF]	2a: UC 312 2b: UC Ballroom Lounge
11:35 — 12:20 PM	Session 3a: Update on New AP CS Principles Facilitated by Pat Yongpradit , Springbrook HS, Montgomery County [PDF] <i>OR</i> Session 3b: What IT Jobs Have to Do with K-12 Education: Everything Presented by Mark Wolkow , NSA/CSS [PDF]	3a: UC 312 3b: UC Ballroom Lounge
12:30 — 1:30 PM	Lunch Panel: Computing Education in Other States Mark Guzdial , Georgia Computes [PDF]	UC Ballroom

[Rick Adrion](#), CAITE [[PDF](#)]

1:40 – 2:30 PM **Future Changes Discussion**

Various
Locations

2:30 – 3:30 PM **Wrap Up**

UC Ballroom

APPENDIX B: Summary of Session Evaluation Forms



Session :# 1 College Student Panel – Dr. Penny Rheingans

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	14	31	7	0	1	3.13	0.76
2. expanded my knowledge and skills for delivering computer science courses	8	24	9	0	12	2.97	1.38
The overall quality of this session was:	Excellent (5) 19	Good (4) 30	Fair (3) 4	Poor (2) 0		4.28	0.60

A. What was the most important thing you learned or gained in this session?

- That a college level computer science may be interested in teaching high school computer science.
- Student perspective
- Student backgrounds...what courses in high school they took and what courses they felt were beneficial in college.
- Great to hear from students now in undergrad
- MSDE does not have standard CS plan.
- Computer science is a very broad field that can appeal to students with varying backgrounds, interests, and aspirations.
- Integrating to see what students' favorite assignments were
- Learning how the students feel about their preparation to study CS.
- What interest "hooks" students
- That students felt collaboration helped them to learn CS more quickly
- Prevalence of internships for UMBC CS students.
- The students on the panel often decided on their interest in CS in HS, though they had varying levels of exposure
- Great idea to use students with different backgrounds and skill levels.
- How differently the men and women discussed their experiences, goals and perceptions.
- What interests HS students -> How do they become interested in CS
- Always good to hear students perspective
- CS can be fun
- Students felt they weren't really prepared for college level CS
- Hearing current perspectives
- A strong need to have a common pathway for CS
- Understanding the students' perspective.
- All students referred to the "stigma" associated with the gamer/comp sci persona.
- It felt like a lot of what I already know.
- CS for its versatility
- Range of HS experience in CS
- I got a college student's perspective on the importance of CS courses.
- Validity of HS course offerings
- Student experiences in getting involved in CS
- Put a human face on issues about which I was already aware.
- The student perspective
- College students have a variety of backgrounds

B. What action will you take or what will you do differently as a result of this session?

- Start recruiting future teachers from high school students
- Please give more information - dense opening. Too long for so little.
- Modify into course to generate more interest
- Allow more group/collaboration work in high school class for CS.
- More talking points for collaborations, APIs, etc
- Allow my students to collaborate on projects.

- Discuss CS options with my district-level colleagues - increase student recruitment. Develop mentoring opportunities for students in my district.
- Try to add real world assignments to courses
- Discuss course offerings and alignment grades 7-12
- Consider the implications of this related to our university programs
- Have some new questions to ponder when thinking of students' experiences.
- Apply for CS teacher position
- Create access to computer science courses for students in our school district
- Encourage students to take computer classes
- Read, read, read
- Encourage collaboration
- Initiate class discussions with my male and female students about perceptions.
- Be more aggressive in promoting CS. I would like to continually communicate with speakers on their progress.
- It was simply a reminder of the lack of early experience to CS.
- I will be more knowledgeable to promote CS.
- I will be more proactive in informing students of their CS options and benefits.
- Increase encouragement of kids to consider CS
- Try to encourage students that CS is not rocket science
- Use some of this information in my program

C. How could this session be improved? (and Other Comments)

- Loved this one!
- More senior students
- Each student have their own microphone.
- Put name tags in front of panelists
- A little shorter
- Perhaps to end and make it a choice
- It was a bit too long. I might have had different questions for them after the other sessions. But I liked the end of day as action.
- Better use of a microphone- hard to hear the students- come up with better questions to ask students - I had to rely on audience
- The Q & A was excellent. The speakers had informative answers but the sound equipment could have been better.
- Selecting students with unique stories about what drew them to CS or ideas they have to inspire others.
- Hard to hear. Excellent session, thanks!!
- The session was actually very, very good!
- Don't put projector slides (from Marie's intro) behind the table, couldn't see the lower half of the slides!
- Session was great as is!

APPENDIX B: Summary of Session Evaluation Forms



Session : # 2a Getting Computing into Tech Ed Courses By Example – Dianne O’Grady-Cunniff

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	8	7	0	0	1	3.53	1.01
2. expanded my knowledge and skills for delivering computer science courses	1	6	5	2	0	3.43	0.74
The overall quality of this session was:	Excellent (5) 9	Good (4) 4	Fair (3) 2	Poor (2) 0		4.47	0.74

A. What was the most important thing you learned or gained in this session?

- Montgomery County is selling DTS curriculum
- Implication of tech ed requirement.
- Continue to keep up the rigor in the CS classes I teach and spread the word to students of the employment opportunities in CS
- Another option for Tech Ed
- The state opportunity for comp sci to count as a math credit
- The politics! Yikes!
- I think we all agree that the State of Maryland made poor choices that effectively derailed CS education.
- I learned that there are exceptions to the MD state graduation requirement as far as technology is concerned.
- Knowledge to plead the case for credit.
- Kathy Olmer (?) said that CS can be a math credit in MD

B. What action will you take or what will you do differently as a result of this session?

- Support use of CS, implement the tech ed course.
- Review of the computer science attendance on FOT
- Continue to instruct w/ Dianne for advice for DTS
- Engage in the process.
- I will research how I can incorporate CS concepts into my Foundations of Technology classes.
- Add some to my classes
- Look into the tech credit situation and overall credit situation

C. How could this session be improved? (and Other Comments)

- Hard to see certain slides
- Dianne is always excellent

Session :# 2b Computer Science Education: What Should You Know About This National Imperative – Chris Stephenson

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	32	6	0	0	0	3.84	0.37
2. expanded my knowledge and skills for delivering computer science courses	20	5	3	0	10	3.61	1.71
The overall quality of this session was:	Excellent (5) 28	Good (4) 10	Fair (3) 0	Poor (2) 0		4.74	0.45

A. What was the most important thing you learned or gained in this session?

- Wow where the US stands as compared to other nations
- The lack of support and knowledge of states and Board of Education's concerning computer science.
- Info about other states' progress
- CS is a socio-economic separator.
- Identified and addressed widespread misconceptions about CS.
- The importance of increasing student enrollment in CS
- What is going on in other states and in other countries.
- The statistics
- Awareness of NSA/University cooperation and STOKES program.
- While Maryland is doing several things well in CS education, it ranks lower than I expected related to having certain standards in place.
- Hearing diversity from Chris Stephenson about the current state of CS education
- The variation across the nation and highlights of some reports.
- The global perspective
- State initiatives
- National standards for CS available
- US is WAY behind the world in CS education
- Reports and resources
- Reinforced the knowledge that there is a strong need for CS reform
- The national picture.
- The current state of delivering CS courses in high school to which a comparison can be made to that in the school I work in.
- What is being done to change policy. Would have liked to hear more about how we can help.
- Everything Chris said. Pointing to the materials on the CSTA website was helpful.
- No national policy on CS education is a huge obstacle
- Details about the national effects of CSTA
- National perspective and to hear what the other states are doing

B. What action will you take or what will you do differently as a result of this session?

- Work harder to expand CS at my school
- Share this info with my administrators and faculty and students.
- Look up some studies
- Encourage more students to pursue CS.
- Not sure
- Speak with District Administrations

APPENDIX B: Summary of Session Evaluation Forms



- Address my school administration about changes/ improvements we need in CS students
- I plan to read a few of the reports I didn't know about.
- Promoting the program on a more broad basis
- Research standard to build pipeline from middle school to high school computer science courses
- Strategies planning at school
- Use of reports and resources in projects
- Share w/ admin + guidance
- Internal view of computer science education.
- I would like to connect more with people who can help promote CS in my school and to take courses that will help me teach CS.
- Be more knowledgeable to promote CS.
- Monitor CSTA
- Pay more attention to CSTA

C. How could this session be improved? (and Other Comments)

- More time
- Access to intro presented. Website?
- Chair seats with no table (more room)
- Need PA system, shut shades, turn off lights, can see screen, (something about a people talking throughout the presentation that was distracting)
- According to colleges who attended 2a- the message about where CS courses should be placed contradict
- Give access to PPT at CSTA site or CE21 site
- Provide 2 page of handout of growth of T jobs in STEM
- More on how we can help policy.
- Excellent in ALL ways!

Session :# 3a Update on New AP CS Principles - Pat Yongpradit

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	21	12	1	0	0	3.59	0.56
2. expanded my knowledge and skills for delivering computer science courses	19	9	3	0	3	3.52	1.20
The overall quality of this session was:	Excellent (5) 25	Good (4) 6	Fair (3) 1	Poor (2) 0		4.75	0.51

A. What was the most important thing you learned or gained in this session?

- Course content + Timeline
- Content of new AP course
- Direction CS Principles is headed
- Excellent overview and timeline of the new AP course.
- The current status of the AP CS Principles course
- Having Brook there was extremely helpful to explain the standpoint of the College Board
- I learned about the work being done to offer a new AP computer science course + test
- Goal
- Nice to have example of how a high school might teach CSP.
- Future for AP testing

APPENDIX B: Summary of Session Evaluation Forms



- Move towards standard curriculum
- The writing portion of AP Comp Sci Principles
- A better understanding of the content of CS principles
- Love the non-programming aspects.
- CSP – new to me
- How to address the 5 E's
- Timeline for new course. AP is a portfolio.

B. What action will you take or what will you do differently as a result of this session?

- Begin long term planning to offer this course. Will need to be included in courses catalog for 2016-2017 (so must be included Spring 2015 edition of that catalog)
- Advocate for credit for this course on college level.
- Go to websites CS principles and Pat's site
- I'll follow up with the College Board (and Pat and Brook!) about implementation.
- Think about how to include CSP at our school
- Implant that could be cover this by 2014-15
- As it is more broadly implemented, I will understand what this course is when I see it on a student's transcript
- I have our school district offer this curricular ASAP and everybody offer the AP class
- Research websites given
- Continue to learn more about this course
- Get online to explore further
- Improve non-programming CS knowledge.
- I will add some more engaging lessons
- Look into 5 E's
- Start getting the teachers in the habit of collecting artifacts

C. How could this session be improved? (and Other Comments)

- More examples of class activities
- Needs more time
- More examples of a lesson in CS Principles.
- Conceptual overview - need more information about the requirements
- I would like to see a complete lesson plan
- Keep on offering this w/ update
- Pat is always excellent

Session :# 3b What IT Jobs Have to Do with K-12 Education: Everything! - Mark Wolkow

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	7	17	1	0	0	3.24	0.52
2. expanded my knowledge and skills for delivering computer science courses	4	11	4	0	5	3.00	1.38
The overall quality of this session was:	Excellent (5) 10	Good (4) 11	Fair (3) 3	Poor (2) 0		4.29	0.69

A. What was the most important thing you learned or gained in this session?

- The availability of programs out there to help students be interested in CS.
- Opportunities to connect w/ NSA

APPENDIX B: Summary of Session Evaluation Forms



- Hearing what others are doing with regards to engaging students and the community.
- Partnership is important, but this is all dependent on the state
- Awareness of NSA/University cooperation and STOKES program
- Outreach programs offered by NAS... although these are not available in rural school districts
- Community resource
- Awareness of what other states are doing for collaboration
- Diversity and job
- Contributions from other attendees about how they are implementing programs to promote CS in other places.
- I learned about programs that NSA offers to help prepare students for CS careers.
- Extent of K-12 outreach
- Involvement of NSA in education (Centers of Excellence)

B. What action will you take or what will you do differently as a result of this session?

- Share info with my faculty/staff/students and parents.
- Find out what is going on in my state
- Need more info what's available across the Bay Bridge the other side of Maryland [and] the Eastern Shore
- Pursue information on Alice
- Using more information from nsa.gov
- Use resources more frequently
- Chr national important
- I will work to make use of the related NSA programs.
- Explore nsa.gov site

C. How could this session be improved? (and Other Comments)

- Names/email/contacts of people
- Same AV issue above but why do teachers need to be told not to talk during presentations??

Session :Lunch Panel: Computing Education in Other States

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	25	21	0	0	0	3.54	0.50
2. expanded my knowledge and skills for delivering computer science courses	15	17	5	5	9	3.27	1.45
The overall quality of this session was:	Excellent (5) 25	Good (4) 19	Fair (3) 2	Poor (2) 0		4.5	0.59

A. What was the most important thing you learned or gained in this session?

- All States don't have a comp sci cert for teachers
- Things that have worked in GA and MA.
- Georgia presenter more relevant to HS very informative. MASS focused on CC into 4 year institution :(
- Many different programs for professional development in CS for secondary teachers.
- What didn't work in GA
- Always good to have fresh perspectives.
- Need coordination at state level to support change
- How other states here (?) reached out to create collaboration of education and industry to tackle this problem.
- Mark is an excellent speaker.
- State autonomy

APPENDIX B: Summary of Session Evaluation Forms



- Different opportunities that are available
- What other states are doing w/ this area
- Good for policies that worked.
- I think that this session just stressed for me the need to improve standards and resources for CS-based education.
- Again, no national standard causes potential issues
- How other states are championing CS
- Big picture view
- Successful approaches
- PSAT can be used for recruitment info
- It was a little too abstract without specific understanding of MD schools structure.

B. What action will you take or what will you do differently as a result of this session?

- Support state efforts.
- Contact some of the websites and/or blogs.
- More geared toward college. Very little for same day
- Share w/ higher ups
- Support CS education by voting
- Look up information
- Connect with these large orgs to learn from their successes.
- Do more networking with community colleges

C. How could this session be improved? (and Other Comments)

- Have more on HS focus
- Lunch rolls without seeds. :)
- Less rapid-fire use of acronyms.
- A bit too general to fully understand what the states did.
- Hard to see some slides
- Not doing it during lunch. Let's give people a mental break and have a time to network.

Session :Future Changes Discussion

This session:	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Not Applicable (0)	Average (omitting N/A)	Standard Deviation
1. increased my awareness and knowledge about national and/or state issues related to computer science education	15	13	4	0	2	3.34	1.05
2. expanded my knowledge and skills for delivering computer science courses	9	12	5	0	8	3.15	1.50
The overall quality of this session was:	Excellent (5) 16	Good (4) 13	Fair (3) 5	Poor (2) 0		4.32	0.73

A. What was the most important thing you learned or gained in this session?

- Promote CS more in schools...begin earlier as in elementary
- Thoughts of other stakeholders
- Understanding of issues
- Learning what they are doing.
- All in agreement CS is an area to stand on its own and every student needs to have it!
- It's confusing.
- Variety of viewpoints + ideas
- We need to have many more discussions about these topics to come to consensus.
- More information from teachers since I am a prospective teacher.

APPENDIX B: Summary of Session Evaluation Forms



- I learned that the course I am to begin to teach in August has not available PD in our state.
- Good information and exchange of ideas from all involved
- The importance of flexibility
- Marie desJardins' 3 main steps
- Important to reach all populations
- I liked hearing other people's ideas
- The summaries seemed redundant.

B. What action will you take or what will you do differently as a result of this session?

- Share what I learned
- Share w/ others in community
- Try to convince current students to go to local schools
- Not sure, and that's frustrating.
- Keep involved + keep talking
- I will do what I can to rectify this situation.
- Structure a district-level lobbying effort.

C. How could this session be improved? (and Other Comments)

- Larger group of people?
- Provide questions in advance of the summit
- I thought it was great!
- More time
- Felt rushed. Some people not engaged.
- It was great to hear from others. This was one of the best ideas to wrap up a conference...just having folks give a reflection out loud so we can all hear.
- Single focus
- Instead of breaking into small groups (rooms) for feedback, maybe we can all stay in the large room and report.

Additional Comments:

- 1) Excellent event! 2) We may have been able to end at 2:30 pm 3) Powerful Conference
- Thank you so much! This was an excellent combination of people!
- I'm not sure what I can do as a university instructor
- Are you working w/ MSDE to define the Computer Science pathway?
- Pay more attention to details, Need better on come PA system, Manage A/V better, People out chatting in hallways disrespected speakers, UC Lounge: people coming in and out all during presentation (C'mon people!) I would like to hear directly from teachers what they need to do their job. And day to day what it's like CS in the schools
- Thank you for doing this! It is so needed. Keep the conversation going!
- The overwhelming feeling is that CS needs to be introduced very early so it is natural for kids and to integrate CS in all our areas of study.
- Excellent! So glad I came! All sessions were highly worthwhile.
- I want to make a note that I will be starting to teach computer science this fall and that I have not yet taught CS. So, I had little or no comments at this time.
- More community college participation. Where are they? Get all parts of MD.
- Great summit!

CE21-Maryland Summit Outcomes

1. Before attending the Summit...	Very Much (5)	Some (4)	A little (3)	Not much (2)	Nothing/Not at All (1)	Average	Standard Deviation
How much did you know about the CE21-Maryland project?	2	16	8	10	7	2.91	1.21
How much knowledge did you have about the current state of the pipeline of students studying CS in high school and college?	10	20	3	7	3	3.63	1.23
How much knowledge did you have about the current state of computer science offerings in Maryland high schools?	8	19	5	7	4	3.47	1.24
How interested were you in increasing student awareness about CS opportunities?	39	2	0	1	1	4.79	0.77
How motivated were you to collaborate with other professionals interested in increasing awareness about the importance of CS?	34	7	1	0	1	4.70	0.74
How aware were you of available resources for increasing interest for CS in K-12?	4	17	8	11	3	3.19	1.14

2. What effect, if any, did the Summit have on your...	Very Much (5)	Some (4)	A little (3)	Not Much (2)	Nothing/Not at All (1)	Average	Standard Deviation
Knowledge about the CE21-Maryland project and its goals?	28	14	1	0	0	4.63	0.54
Knowledge about national initiatives to improve computer science education?	26	17	0	0	0	4.60	0.49
Knowledge of national reports documenting the crisis in computer science education?	19	16	8	0	0	4.26	0.76
Interest in learning more about the current state of computer science education in Maryland?	29	10	3	0	0	4.62	0.62
Interest in learning more about the current state of computer science education in my local school district?	24	8	10	0	0	4.33	0.85
Knowledge about resources available to increase student interest in CS?	18	22	3	0	0	4.35	0.61
Ability to educate other teachers, administrators, parents, and leaders about the importance of computer science education?	12	25	4	0	0	4.20	0.60
Interest in participating in future events related to computer science education in Maryland?	32	8	1	0	0	4.76	0.49
Ability to talk and share information with others about the CE21-Maryland project and its goals?	16	20	6	0	0	4.24	0.69
Personal network of colleagues/professionals who are also interested in CS education?	14	23	5	0	0	4.21	0.65
Ability to identify others to collaborate with to improve computer science education in Maryland?	16	23	2	0	0	4.34	0.57

3. What effect, if any, did the Summit have on your...	Increased a Lot (5)	Increased a Little (4)	No Change (3)	Decreased a Little (2)	Decreased a Lot (1)	Average	Standard Deviation
Commitment to improving computer science education in Maryland?	21	15	3	0	0	4.46	0.64
Commitment to increasing student interest in computer science in Maryland high schools?	24	11	3	0	0	4.55	0.64
Willingness to contribute to long-term change of computer science education in Maryland?	22	16	2	0	0	4.50	0.60
Commitment to increasing the diversity of students taking CS in Maryland high schools?	22	14	2	0	0	4.53	0.60
Willingness to talk with leaders in your organization about the importance of computer science education?	25	13	2	0	0	4.58	0.59
Willingness to collaborate with other professionals to make computer science a high school requirement?	25	12	4	0	0	4.51	0.68

4. What is/are the most important thing(s) you learned at the Summit?

- Resources: Exploring Computer Science website, www.mrs-o-c.com, CS Unplugged website, Code Academy, book: Blown to Bits, CS principles.org
- Complex potential students
- How disjointed the system is across the state of Maryland related to curriculum (especially related to computer science)
- The student panel. I gained some knowledge of student perspectives and perhaps how to address students.
- The extent of the challenges faced in this effort. (Discouraging!) But also happy that you've taken the lead to get people organized.
- Current state of affairs; contracts to try to move things forward.
- Difficulty faced in education due to diversity of standards.
- Since I will just begin teaching CS this fall, I learned more than I can record here. Most important was that as we increase CS requirements especially for our state we need to be sure to provide professional development worthy of the programs.
- That we should all work together across government, academia, and business to give CS the prominence and support it needs NOW! Yes to HS credit!!
- That there is a strong community.
- Any new development in the progress of promoting CS courses in HS and improving participation of minorities in CS enrollment.
- We all have a common goal.
- CS must diversity as the population diversifies. Must increase attraction AND retention. This is a political issue/policy issue that is delicate to fix.
- How challenging and complex the issue is (politics). It is amazing that there is so much consensus on what/how to teach CS.
- Common core - different states have different interpretations.
- That CS is treated as a tech elective or a general elective and is fighting to be recognized/required. In general, I was surprised how much today focused on policy vs social issues (eg girls in tech).
- Must reach back further and identify students earlier.

- So many resources and options to promote comp sci in high school.
- The need for stronger CS in K-12
- Status of CS Principles
- Meeting teachers and industry representatives who could contribute to the program I work with.
- Resources available to support computer science.
- CS is fun
- The distinction between technology education and technology standards versus computer science and its teaching standards.
- The need for computer science literacy is greater than I thought. If students aren't prepared at all levels, our society will not grow to meet STEM needs.
- Status of Principles of CS and resources
- Resources
- State of CS in Maryland, CS Principles
- Information about AP Computer Science
- CS Principles
- Just reaffirmation – input of undergrads

5. What are you going to do with the information gained at the Summit?

- Empower my CS advisory board (at district level)
- Unknown
- Engage in CS conversations with others in my district
- To lobby for CS to be a core requirement
- Network
- Share with colleagues at work; follow up with contacts made at the event
- Take back to industry
- Benefit!!!
- Work toward to meeting #4, starting within my university
- Use what was learned
- Talk to my principal and department heads about what we are doing to attract and retain students.
- Will join CSTA/CSTA-MD
- Share information, expand partnerships
- Increase my involvement as a speaker/mentor at local schools
- Share with colleagues.
- Share with faculty and administration and work/study coordinator
- Work to improve CS instruction in my district especially grades 7-12
- Think about encouraging collaboration with (?) and education to train CS teachers at my school.
- Work to keep in touch with these new contacts and look for mutually beneficial opportunities to work together.
- Begin state computer science programs and study.
- Apply to current courses
- Research the implementation of computer science pipeline in K-12 for our district.
- Share with co-teachers and co-administrators.
- Share with family, friends, colleagues, students, etc.
- Use in my classes I teach and direct my private school is CS in the future.
- Use resources in project
- Share with admin, guidance, and department members.
- Reach out to girls.
- Share with other teachers and STEM department.
- Continue conversation with those at my school/community.

6. Demographics

Gender (40 responses):

Female: 25

Male: 15

Race (39 responses):

African American/Black: 7

Asian American: 1

Hispanic/Latino: 0

Native American: 0

White/Caucasian: 30

Multi-racial: 1

7. Professional position/role (26 responses):

High school teacher: 14

Middle school teacher: 0

K-12 Administrator: 4

College/university faculty: 4

Industry professional: 2

Other: 2