Welcome to the National Girls Collaborative Project
National Webinar

Microsoft Philanthropies and Inclusive Computer Science Education

April 23, 2019

Agenda

• NGCP Vision and Goals
• Introduction to Microsoft Philanthropies
• Presentation about the ‘Guide to Inclusive Computer Science Education’
• Q&A
• Closing
Vision

The National Girls Collaborative Project brings together organizations committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM).

NGCP Goals

1. Maximize access to shared resources within organizations interested in engaging girls in STEM.
2. Strengthen the capacity of programs by sharing exemplary practice research and program models.
3. Use the leverage of a network to achieve gender equity in STEM.
National Network of Collaborative Teams

Speakers

Greg Bianchi,
Senior Program Officer,
Microsoft Philanthropies

Joanna Goode,
Associate Professor, College of Education Studies,
University of Oregon
Inclusive Computer Science Education

Greg Bianchi
Microsoft Philanthropies

Our Mission
Increase equitable participation in high-quality computer science education.
Why computer science education

“If we are ensuring that there are diverse teams and diverse folks at the table at every step of the pipeline, it creates the opportunity to have tech look like the world that it represents, which benefits us in a million different ways.”
— Dr. JeffriAnne Wilder, NCWIT

K-12 CS access report

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<th>Underrepresented Minority Students and Access to Computer Science (CS)</th>
<th>Income Level and Access to Computer Science</th>
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<td>Percent of Schools Teaching CS</td>
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<td>Percent of URM Students in the School Population</td>
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Microsoft Philanthropies approach

Interest & Belonging

Capacity

Systemic Change

Microsoft Philanthropies approach

Microsoft Philanthropies TEALS Program

Year-round in class teacher professional development from trained industry professionals

Industry volunteers support classroom teachers and build CS teaching capacity

A ten-year track record with hundreds of teachers and schools
TEALS – A True Industry & School Partnership

- 500 Schools
- 1,500 Volunteers
- 18,000 students
- 500+ Companies
- States + BC

Guides for computer science education

[Images of computer science education guides]

www.microsoft.com/digitalskills
Inclusive Computer Science Education:
How educators can encourage and engage all students in computer science

Joanna Goode, University of Oregon

Researching the problem

Why are there so few girls and so few students of color studying computer science in school?

Structural Barriers
Inequitable offerings between schools, ‘tracking’ of students within schools, lack of teacher preparation, “technology rich, curriculum poor”

Belief Systems
“Preparatory privilege” was often misinterpreted by counselors, teachers, and students themselves as differences in aptitude
What is computer science, anyway?

The study of computer and the principles and practices used to make them do useful things for society

**CS CONCEPTS**
- Computing systems
- Networks and the Internet
- Data and analysis
- Algorithms and programming
- Impacts of computing

**CS PRACTICES**
- Fostering inclusive computing culture
- Collaborating around computing
- Recognizing and defining computational problems
- Developing and using abstractions
- Creating computational artifacts
- Testing & Refining computational artifacts
- Communicating about computing

Researching the solution

How can education reform efforts (curricular, instructional, and policy) support inclusive learning opportunities for girls and students of color in computing?
For each of these sections, we will:

- Discuss key considerations related to equity and inclusion
- Provide related resources
Access

Elementary School – integration of computing lessons often takes place across other subject areas (See case study)

Middle & High Schools - Computer science courses are typically standalone courses: typically not part of core, required curriculum

Informal Learning Spaces – Content and availability to participate in programs widely varies

DIVERSITY: School Considerations

SCHOOL ECOSYSTEM – Administrators, counselors, teachers, families, and students can all advocate for and support CS learning opportunities

COUNSELORS – As gatekeepers to non-required courses, counselors can be excellent champions for CS learning, or they can unknowingly filter out students.

“If you change the way that guidance counselors think about who is right for computer science, that changes who they recommend for the course. And then you have students giving it a try who never would have done that before.”

— Letie Arens, NCWIT
DIVERSITY: Attracting CS learners

Generate a steady narrative about how CS is creative and critical to solving real-world problems.

Role models and other guest speakers can connect with students in different ways by talking about their work and experiences.

Enlist current CS leaners to promote CS education with ‘peer presentations’ or with younger children.

Address intersectionality by introducing students to female role models of different races and ethnicities.

Visit FabFems to learn more.

INCLUSION: Learning Spaces

Feature examples of real-world applications of CS in learning spaces.

Display student projects and contributions.

Arrange learning space to promote collaboration and hands-on activities.

Design learning spaces that are accessible to students with diverse abilities.

Make sure technology resources support the needs of students.
INCLUSION: Learning Spaces - Universal Design

“In physical spaces, support accessibility to CS learning environments for all types of people

Lessons should account for students’ varied abilities and use accommodation, assistive technologies and other approaches to make computing accessible for students with disabilities

Students should be taught principles of universal design as they begin creating their own technologies

“Look for a curriculum that has threads of universal design, rather than choosing a narrow curriculum and trying to make it inclusive.”
— Dr. Maya Israel, Creative Technology Research Lab

INCLUSION: Instruction - Inquiry

Emphasize the problem-solving process, and how different perspective and approaches can result in multiple solutions encourage students to take ownership over their own learning

Encourage exploration and creativity and support growth mindset of students

Encourage risk-taking and showcase mistakes as learning opportunities, by showcasing learning through sharing “my favorite bug of the day”

Help support scaffolds and differentiated supported, as needed, for learners
INCLUSION: Instruction - Culturally Responsive Teaching and Learning

Rigor - Maintain high expectations for all students to counter stereotypes about who excels in CS

Relationships – Build relationships with students to identify opportunities to connect learning to their experiences

Relevance - Connect to students’ cultural experiences and realities, including real-world topics

Acknowledge how issues of power and privilege in CS realm has history of marginalizing groups of people, examine how policies and collective agency might disrupt these forces

“...wanting to create an app that would warn people with asthma about poor air quality, because it was something directly relevant to their lives.”
— Dr. Alison Scott, Kapor Center

Inclusion: Curricular Materials

Allow students choice and variety in aesthetics and features in their work

Use hands-on, project-based learning

Develop cohesive progression of CS Learning opportunities

Select materials that highlight diversity and inclusion in meaningful ways

Include lessons that build on cultural assets, knowledge, and interests of students

Incorporate learning materials that are accessible for students of all abilities
Inclusive Guide Acknowledgements

- Leslie Aaronson, National Center for Women & Information Technology
- Jake Baskin, Computer Science Teachers Association
- Doug Bergman, Porter-Gaud School
- Callista Chen, Tech Bridge Girls
- Leigh Ann DeLyser, CSforAll
- Lien Diaz, Georgia Tech College of Computing
- Maya Israel, Creative Technology Research Lab
- Andy Ko, University of Washington
- Frieda McAlear, Kapor Center
- Brook Osborne, Code.org
- Allison Scott, Kapor Center
- JeffriAnne Wilder, National Center for Women & Information Technology

Inclusion guide resources

Diversity
- Girls in STEM Action Guide for education and nonprofit leaders, teachers and parents: https://aka.ms/stemactionguide
- FabFems: https://www.fabfems.org/find
- NCWIT Counselors for Computing resources: https://www.ncwit.org/project/counselorsforcomputing-c4c
- NCWIT Top 10 Guide for engaging counselors as allies: https://www.ncwit.org/resources/top-10-ways-engage-school-counselors-ataccessincreasestudent-access-computer
- Meet Code Creators video series from Code.org and Skype in the Classroom: https://aka.ms/codecreators
- Diversity posters and displays from Code.org: https://hourofcode.com/promote/resourcedisplaysposters
- Find diverse guest speakers in CS through Skype in the Classroom: https://education.microsoft.com/skype-in-the-classroom/find-guest-speakers
- TACTICal Teaching Brief for effective CS co-teaching: https://tacticalteaching.org

Access
- Computer Science Professional Development Guide: https://aka.ms/CSPDguide
- AccessCSforALL resources for a range of student abilities: https://www.washington.edu/accesscsforall
- Additional CS education research: https://accessresearch.org

Accessible learning and universal design
- Profiles of CS professionals and students with disabilities from Alliance for Access to Computing Careers: https://www.washington.edu/accesscomputing/stories/accesscomputingprofiles
- Universal Design for Learning framework: https://tacticalteaching.org

INSTRUCTION
- Strategies for Effective and Inclusive CS Teaching course by the University of Texas at Austin: https://sitemcenter.utexas.edu/training/effectived-and-inclusive-cs-teaching
- CSforAll teachers community of practice: https://naturalteachers.org
- Computer Science Teachers Association (CSTA) information and membership: https://www.csteachers.org
Inclusion resources cont.

Accessible learning and universal design
Profiles of CS professionals and students with disabilities from Alliance for Access to Computing Careers:
https://www.washington.edu/accesscomputing/resources/accesscomputing/profiles
How Can We Include Students with Disabilities in Computing Courses video:
Universal Design for Learning framework:
https://ctrl.education.illinois.edu/TACTICal/udl

Instruction
Strategies for Effective and Inclusive CS Teaching course by the University of Texas at Austin:
https://stemcenter.utexas.edu/strategies/effective-and-inclusive-cs-teaching
CSforAll teachers community of practice:
https://csforallteachers.org/
Computer Science Teachers Association (CSTA) information and membership:
https://www.csteachers.org/

MakeCode for MicroBit Curriculum for hands-on learning:
https://makecode.microbit.org/courses/csintro
Code.org CS Fundamentals (elementary school):
https://code.org/educate/curriculum/elementary-school
Coding with Minecraft (elementary school):
https://education.minecraft.net/class-resources/coding-with-minecraft
CS Discoveries (middle school):
https://code.org/educate/csd
Exploring Computer Science (high school):
http://www.exploringsc.org/curriculum
TEALS Intro to CS (high school):
https://tealsk12.gitbook.io/intro-cs/
AP CS Principles (high school):
https://apcentral.collegeboard.org/courses/ap-computer-science/principles/course
Quorum programming language:
https://quorumlanguage.com/

Inclusive practices & policies are essential for ensuring Computer Science is accessible and engaging for All children
Questions and Discussion

Thank you!