National Center for Women & Information Technology
P R O M I S I N G   P R A C T I C E S

How Can You Engage A *Diverse Range* of Girls in Technology?

Too often, educational policies and public rhetoric assume that girls — and in particular, girls of color — lack the interest, ability, or stamina required for computing courses and careers. However, decades of *constructivist (and constructionist)* educational research reveal fundamental flaws with these "deficit" views. This research, instead, illustrates the powerful potential of educational approaches that **1)** assume *all* students can succeed, **2)** make curriculum meaningful and relevant, and **3)** connect knowledge and learning to students' strengths, interests, and prior experiences.

Culturally responsive pedagogies (CRP) share much in common with these constructivist approaches, but they also stress the importance of paying attention to how students' interests, needs, and prior experiences vary in terms of race, class, gender, ability, and sexual orientation. CRP helps students connect learning to these multiple, intersecting identities and to consider how issues of power, equity, and culture relate to education and to society at large.

C*ulturally responsive computing (CRC)*, in particular, helps youth examine the relationship between technology, identities, cultures, and communities. In short, a chief goal for CRC is to involve girls in becoming *technosocial* change agents — that is, individuals who can interrogate and intervene in existing societal and power relations even as they design new technologies.CRC helps address three existing limitations of computing education.

- **First, CRC moves beyond approaches that target girls as a fixed *demographic* group.** CRC instead stresses the *social construction of identity*, helping students ask questions about what it means to "be a girl or boy" and how these kinds of identities shape their decisions about future education and careers.

- **Second, CRC moves beyond approaches that focus only on gender.** Instead, CRC highlights the importance of intersectionality. Educators and students ask questions about how race, class, sexuality, and ability, shape the curriculum, technology, and students' lives in different ways.

- **Third, CRC challenges the assumption that computing education will *inevitably* lead to better opportunities for girls.** While both education and technology can open up exciting opportunities, they often reproduce existing biases and inequalities in new ways. CRC helps students ask questions about language and power and encourages them to re/create technologies that challenge existing biases, power relations, and conditions in their local communities and beyond.

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CULTURALLY RESPONSIVE COMPUTING: FIVE TENETS
(ADAPTED FROM SCOTT, SHERIDAN & CLARK, 2014)

- All students are capable of technical innovation.

- The learning context supports transformational use of technology — that is, students are encouraged to innovate and create for their own purposes not follow prescribed instructions or carry out educators' pre-conceived projects.

- Interest and ability in technical innovation is fostered when students examine connections between technology, computing, and their emerging identities.

- Connecting technology with community issues is vital for engaging diverse youth and transforming existing social conditions.

- Measures of program success should include assessment of critical literacies and account for who creates, for whom, and to what ends.

RESOURCES

Ashcraft, C., Eger, E., & Friend, M. (2012). *Girls in IT: The Facts.* National Center for Women & Information Technology.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Education Research Journal, 35*, 465-491.

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COMPUGIRLS: Fostering Innovation and Developing Technosocial Change Agents (Case Study 1)
Engaging A Diverse Range of Girls in Technology through Culturally Responsive Computing

K-12 Education

Computing curricula taught in the abstract and without relevance to students' identities, lives, and communities dampens their engagement and hinders their persistence. Culturally responsive computing (CRC) programs help educators connect computing curriculum to the interests, prior experiences, and needs of students diverse in gender, race, class, ability, and sexual orientation. One such promising program is COMPUGIRLS.

The program consists of 3 courses:

- **Digital Storytelling for Social Justice:** Girls create digital movies and podcasts about a social justice topic.
- **Think Like a Programmer, Design Like a Change Agent:** Girls program videogames using SCRATCH.
- **Virtual Worlds for Social Change:** Girls address social justice topics, programming projects in virtual worlds.

Early in the first course, girls select a social justice issue relevant to their communities; they then conduct research and create technology solutions to address these issues. Girls work collaboratively with one another and with their "mentor-teachers" — educators who serve as coaches learning alongside their students. Courses take on different formats, including after-school, weekend, or summer class sessions, and girls graduate after completing 195 hours in the program.

Key to the program's success is its focus not only on computing but also on critical conversations around difference in society, social justice, and the process of becoming technosocial change agents. Consider the following representative comments from interviews with girls in a 2-year mixed-method study of the program:

"It helps a lot with confidence when going into a field that you're not sure about. I know some girls who want to go into technology, but they don't think they can do it because of their skin color or because they're girls. And I think that this program was really beneficial." (High-school participant)

"I got a lot out of it being social justice and not just a free for all kind of thing…I'm learning about stuff that I…was not paying attention to…if I wasn't in COMPUGIRLS.'" (Middle-school participant)

Continued longitudinal research is underway to understand how girls' experiences in COMPUGIRLS translate into their future plans to pursue technology education and careers.

INITIAL FINDINGS FROM A 2-YEAR MIXED-METHOD STUDY:

- Girls find the culturally relevant and social justice aspects of the program key to their sustained participation and interest

- As developing technosocial change agents, girls move through three stages: analyzing media representations; analyzing technical design features; designing technical solutions to community problems

- "Shifting the spotlight" to focus on *multiple intersecting identities* (e.g., gender, race sexual orientation) is key to productive discussion about technology and social justice

- Opportunities for play and exploration are important to balance discouragement that can arise when talking about social inequities

RESOURCES

COMPUGIRLS Website: https://sst.clas.asu.edu/compugirls.

Eger, E., Ashcraft, C. & Scott, K. (2014) *Challenging Occupational Exclusion and Stereotypes of Computing Education Via Culturally Responsive Computing Curricula*. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Scott, K.A. & White, M. (2013). COMPUGIRLS' Standpoint: Culturally responsive computing and its effect on girls of color. *Urban Education, 48-5*, 657 - 681.

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.
This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.