national center for women & INFORMATION TECHNOLOGY

ENRICH PK-8 COMPUTING EDUCATION AND PREPARE *ALL* STUDENTS FOR THE FUTURE

EXPAND OPPORTUNITIES FOR COMPUTING EDUCATION

HOW CAN EDUCATORS HELP?

PK-8 students have limited opportunities during the school year to learn these skills, and most students — especially girls — are missing out. Educators can help by integrating computing skills into existing curricula and/or connecting students to informal learning environments that emphasize hands-on experience with technology. Whether it is an in-class activity, an after school coding club, a weekend workshop, or week-long summer camp, these experiences will provide students the opportunity to become aware and learn more about technology careers and opportunities that are available in PK-12, higher education, and beyond.

EDUCATORS CAN:

- Bring inspiring professionals in as guests to share their stories, challenges, and experiences about the importance of computing. Seek out guests who belong to groups that are underrepresented in the tech field. ***Resources:*** Find Inspiring Speakers (ncwit.org/ngcprolemodels); CS Ed Week Volunteers (ncwit.org/csedvolunteer)
- You don't have to be an expert to start teaching computer science! Model curiosity and engagement: We are all learning as this field grows and integrates into our world. ***Resources:*** Sci Girls 7: How to Engage Girls in STEM (ncwit.org/scigirlsseven); Sample lesson ideas from Careers with STEM (ncwit.org/cwceducators)
- Advance their own computing knowledge and professional capabilities. ***Resources:*** Regional Computer Science Teacher Assn (CSTA) Chapters (ncwit.org/cstaregional); Code.org/teach (includes course catalog for 3rd party vendors as well)
- Encourage creativity and risk-taking by welcoming the engineering process. Encourage trial-and-error through experimenting and iterating.
- Try out interesting and creative ways to teach computing without having to worry about grading (ncwit.org/ngcpengage). Think of it like an art project — introducing technology offers opportunities to build creative confidence. ***Resources:*** 15+ Ways of Teaching Every Student to Code (ncwit.org/edutopia15ways); Using Hour of Code in Your Classroom (ncwit.org/kahnclassroom)

WHY IS COMPUTING IMPORTANT?

Computing and computational thinking are increasingly important 21st-century skills. Students often think they are competent computer users, but few can design computing devices, write programs or use computational thinking to solve problems. These skills open the door to rewarding and influential careers (many of which have yet to be created) and are vital for the next generation of diverse, engaged citizens. If you need help making the case for why computing education is important, see *Moving Beyond Computer Literacy: Why Schools Should Teach Computer Science* (ncwit.org/schools).

ENGAGE AND ENCOURAGE DIVERSE PARTICIPATION IN COMPUTING

Building confidence and community are essential for developing interest and skills and ensuring that a diverse group of people participate in creating tomorrow's technology.

Currently, women, are seriously underrepresented in computing education programs and professions. In 2016, only 23 percent of Computer Science AP test-takers were female, and only 26 percent of professional computing occupations in the U.S. workforce were held by women. The numbers are even more problematic when it comes to women and men of color, particularly African American, Latinx, and Native American women and men. Likewise, people with disabilities are often absent from occupations involving technical innovation.

This means that these groups are denied access to one of the most rapidly growing and highest-paying sectors of the US economy. In addition, society suffers as their perspectives are not included in shaping the technology of the future. The resources here can help engage a wider array of students, especially girls diverse in race, class, and ability in computing.* ***Resource:*** By the Numbers (ncwit.org/bythenumbers)

EXPOSURE AND ENCOURAGEMENT MAKE A DIFFERENCE

Exposure to in-class and extracurricular activities and participation in mentoring programs can improve girls' and other underrepresented groups computing skills and confidence and increase their interest in computing education and careers. ***Resources:*** Role Models and Mentoring (ncwit.org/globaloria); Find STEM Opportunities Near You (theconnectory.org). Additionally, simple words of encouragement from educators can have a significant impact on girls' persistence in computing (ncwit.org/academicencouragement). When students express doubts about their computing abilities, a sincere, encouraging response that recommends persistence can make all the difference.

RESOURCES

- Talking points about what a career in computer science is and how a student can begin preparing:
  - » Why Should Young Women Consider a Career in Computer Science? (ncwit.org/youngwomen)
  - » Careers with STEM (careerswithstem.com.au)
- List of organizations that engage targeted audiences of underrepresented girls in science, technology, engineering, and mathematics (STEM) education opportunities (ncwit.org/ngcporglist)
- Resources for providing exposure to female professionals in the technology industry, either through role models (Fab Fems (fabfems.org)) or videos (Technolochicas (technolochicas.org); Made With Code (ncwit.org/mwcmentors); SciGirls (ncwit.org/scigirlsrolemodels))

**NCWIT's mission is to increase the participation of "girls and women" in computing. It is important to point out that this means all people who identify as women and girls, taking into account the ways they vary in race, class, sexual orientation, ability, and more. While focusing on girls/women can unintentionally reinforce gender binaries, these continue to be relevant identity categories. We hope to raise awareness about using these terms in a fluid way that allows for multiple forms of gender expression.*

PARTNER WITH ESTABLISHED PROGRAMS

Many youth-serving organizations already have brand recognition, computer labs, advertising, recruitment, and registration. Your school district may also have relationships with such organizations. Find out what is already happening in your area by checking out these organizations:

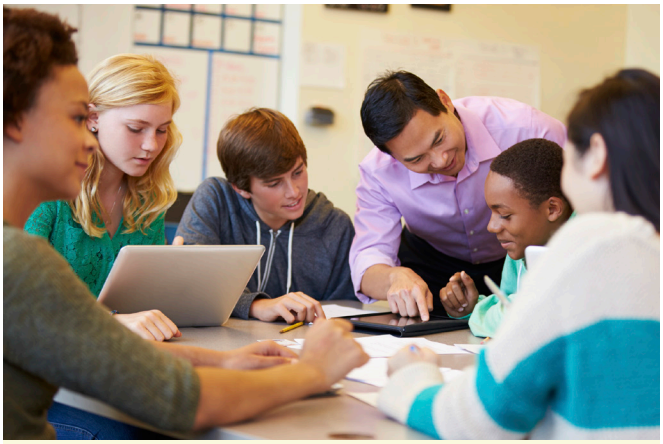
COMPUTER SCIENCE FOCUSED PROGRAMS	LOCAL ORGANIZATIONS THAT MAY OFFER COMPUTING ACTIVITIES
• The Connectory (theconnectory.org) - register and use the Partner Search tool in the Provider Portal (ncwit.org/theconnectoryportal) to identify programs with overlapping interests • Aspire IT (ncwit.org/apireitprograms) • Black Girls Code (blackgirlscode.com) • Girls Who Code (girlswhocode.com) • Regional Computer Science Teacher Assn (CSTA) Chapters (ncwit.org/cstaregional) • TechGirlz (techgirlz.org)	• Girls Inc. (girlsinc.org) • YWCA (ywca.org) • Girl Scouts of the USA (girlscouts.org) (click on Find a Council to locate the office nearest you) • County recreation departments • Schools, universities, or colleges • 4-H groups • Religious organizations • Local Libraries • Boys and Girls Clubs (bgca.org)

USE OR ADAPT ESTABLISHED CURRICULUM

Computing content that appeals to a broad audience has been developed by a variety of organizations and professionals. You can adopt or adapt this curriculum for a quick start on topics, examples, and lesson plans.

GET STARTED

- **Code.org** (ncwit.org/codeorgcourses) has free one-hour tutorials in a variety of subjects and coding languages and links to 3rd party courses and materials.
  - » Elementary School Material (ncwit.org/codeorgelementary)
  - » Middle School Material (ncwit.org/codeorgmiddleschool)
- **CodeSpark** (codespark.org)
- **Computer Science Unplugged** (csunplugged.org) is a free resource that offers engaging physical activities for conveying computing concepts without a computer.
- **Scratch** (scratch.mit.edu) is free software that lets kids create 2D animations and games using drag-and-drop programming. When using the web version, one can select the language you want to use (there are lots!).
  - » **CS First** (ncwit.org/csfirst) is a free Scratch curriculum chunked under topics that appeal to a wide audience of students.
- **Alice** (alice.org) is a block-based programming environment that makes it easy to create animations, build interactive narratives, or program simple games in 3D.
- **Made with Code** (madewithcode.com) was designed by Google to inspire teen girls to see that code can help them pursue their passions.
- **Tech Kids Unlimited** (techkidsunlimited.org) teaches technology to students who learn differently in a supportive work-based learning community.



EXPLORE MORE

- **CS Education Week** (csedweek.org/learn) has Hour of Code tutorials. Find a variety of tutorials aimed at a wide age group and connected to a variety of subjects.
- Get Skills and Study Online - **Careers with STEM** (ncwit.org/cwcdirectory) has links to free resources to code on your own and advance skills.
- Additional reading on computing camps and workshops (ncwit.org/campsadditionalreading) **CS First** (ncwit.org/csfirst) is a free Scratch curriculum chunked under topics that appeal to a wide audience of students.

Much of the information provided is from third parties and your experience may vary. We offer it for your convenience in the hope that you will find it helpful. We would love to hear from you on your experiences of offering a summer camp or workshop and/or using any of the provided materials. Please also suggest other materials as this list is not comprehensive.

ncwit.org

NATIONAL CENTER FOR WOMEN & INFORMATION TECHNOLOGY (NCWIT)
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