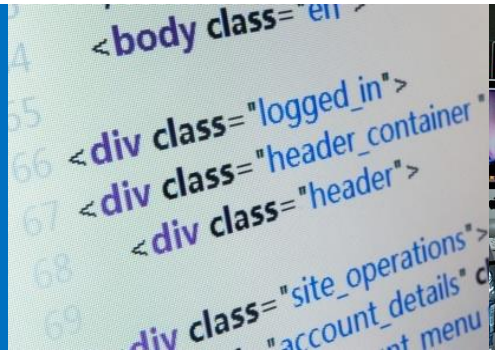


Computing in Afterschool

What is computing?

Computing is an umbrella term that refers to a range of activities within computer science, information technology, and other related activities. The unifying theme is that kids should be *creating* technology, not just learning to *use* it. Kids could program a robot to compete in a robotics competition, write code for an animation that tells a story, design a mobile app or website, make their own video game, or even develop a computer program that solves math problems! The possibilities are endless, which is what gives computing education so much potential.

An easy way to get started

Hour of Code

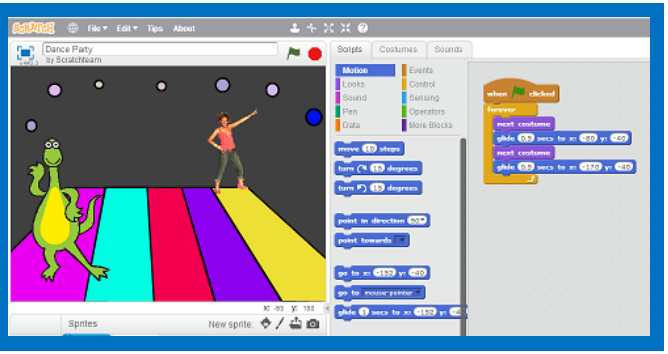
The Hour of Code is an initiative from Code.org designed to be a quick one-hour introduction to get kids excited and interested in coding. Hour of Code events are often hosted during Computer Science Education Week, which takes place every year during December. However, you can host an event at any time! Students can choose from several one-hour tutorials with fun themes like Star Wars, Minecraft, and Frozen. There are "unplugged" tutorials for those without access to computers or internet, and tutorials available in multiple languages. Code.org has developed a couple resources especially for afterschool programs:

- How-to guide for afterschool educators, which includes a lesson plan template
- Webinar: Coding in afterschool: Get started with the Hour of Code! (November 2015)

Activities & Curriculum

Scratch *from MIT Media Lab*

Scratch is a free web-based programming environment for interactive media, as well as a community for sharing those creations. Users can create animations, stories, games, and more! It is one of the most popular platforms for teaching computer science in the out-of-school time field. Several of the following resources utilize Scratch.



Build IT *from Girls Inc. and SRI International*

Build IT is an afterschool and summer curriculum for middle school girls to develop information technology (IT) fluency, interest in mathematics, and knowledge of IT careers. In the program, girls explore and tinker with existing information technologies (e.g., web-based tools, collaboration tools, wireless and mobile devices) and create their own technologies using simple programming tools. Participants interact with female IT professionals to encourage girls to consider a career in IT. Throughout the program, girls are required to demonstrate their developing technology fluency and what they are learning to their peers, youth development leaders, parents, teachers, and the larger community. Access the full curriculum and evaluation tools here: buildit.sri.com

Code Combat

CodeCombat is a web (and soon to be iOS) fantasy game that teaches players the basics of computer science. The game itself is set in a fantasy realm in which the player must code to defeat the forces of the marauding ogre hordes. CodeCombat is recommended for students aged 9 and up. codecombat.com

Creative Computing Guide *from MIT Media Lab*

Computer science and computing-related fields have long been introduced to young people in a way that is disconnected from their interests and values – emphasizing technical detail over creative potential. “Creative computing” supports the development of personal connections to computing, by drawing upon creativity, imagination, and interests. This free guide provides 44 activities across 7 units using the Scratch platform and is available in multiple languages. scratched.gse.harvard.edu/guide

CS Unplugged

CS Unplugged is a collection of free learning activities that teach computer science principles through engaging games and puzzles that use cards, string, crayons and lots of running around—no computer needed! The goal is for young students to dive head-first into computer science, experiencing the kinds of questions and challenges that computer scientists experience, but without having to learn programming first. Educator resources include a full set of videos demonstrating how activities can be run and the solutions to each challenge. csunplugged.org

Family Creative Learning *from MIT Media Lab*

Family Creative Learning is a workshop series that engages children and their parents to learn together—as designers and inventors—through the use of creative technologies. Workshops are intended to strengthen the social support and expertise of families with limited access to resources and experiences around computing. Families participate in a series of five 2-hour workshops held in the evenings. Every workshop begins with dinner, followed by a collaborative design activity using Scratch and MaKey MaKey. With Scratch, families program their own interactive stories, games, and animations. With MaKey MaKey, families create physical interfaces to computers, using everyday objects that conduct electricity (such as fruits or Play-Doh). The workshop series culminates in a showcase night for families to share their projects to the whole community. Download the guide here: family.media.mit.edu

Google CS First

Each CS First club is based on a real-world theme and offers about 10 hours' worth of lessons and activities. The different club themes aim to attract and engage students of varying backgrounds and interests, including art, storytelling, and game design. All materials are targeted at students in 4th - 8th grades (or between the ages of 9 - 14) and are free. Students learn by watching videos on the computer and code using Scratch; all videos, facilitator scripts, daily agendas, curriculum and other club materials are provided by Google. Register to start a club here: www.cs-first.com

Techbridge

Techbridge is a highly-regarded afterschool and summer program for girls. Their curriculum is designed to increase interest in STEM, promote inquiry, and highlight real-world applications so kids can see how STEM careers make the world a better place. All units are appropriate for middle school students; many activities can be simplified for use with younger grades, while others can be made more in-depth and complex for high school students. In the Computer Science unit ($25), kids learn about computer science fundamentals, practice programming skills, learn about Internet safety, and create webpages using HTML. www.techbridgegirls.org/index.php?id=21

Thinkersmith

Thinkersmith is a non-profit dedicated to introducing youth to the fun, passionate and creative side of computer science and computational thinking, with the goal of attracting and retaining non-traditional computer science students. The full 10-lesson curriculum is $50, and two "unplugged "activities are available for free. thinkersmith.org/shop

Other Resource Lists

- Kid-Friendly Programming Languages from Science Buddies
- Educator Resources from Code.org

Develop Your Skills

Creative Computing Online Workshop *from ScratchEd*

This free, six-week online workshop will teach you more about using Scratch and supporting computational thinking in the classroom and other learning environments. Developed by the ScratchEd Team at the Harvard Graduate School of Education, the workshop originally ran in summer 2013, and is archived here: creative-computing.appspot.com/course

Code Studio Educator Workshops *from Code.org*

Code.org's curriculum Code Studio was developed for in-school use, however out-of-school time educators are welcome to attend the free in-person workshops that take place across the county. You can also take an online version. Find a local workshop here: code.org/professional-development-workshops

ScratchEd is the online educator community for the Scratch programming environment. You can ask questions to other practitioners, participate in discussions, and access user-submitted curriculum, video tutorials, warm-up activities, project ideas. Sort resources by the "most bookmarked" to find some of the more well-developed submissions, like the Scratch Cards or the Design Studio Activities.

Background Reading

Here are a few key reading materials to help you understand the state of K-12 computing education in the U.S., and some key concepts to get you thinking about how afterschool can play a role in providing engaging, high-quality computing learning opportunities for *all* youth.

Title	Author	Description
Computing and Engineering in Afterschool (December 2013)	Afterschool Alliance	This issue brief provides background on some of the challenges within K-12 education around computing and engineering, and highlights afterschool programs that are engaging kids in these topics.
Searching for Computer Science: Access and Barriers in U.S. K-12 Education (2015)	Google	This research study, in two parts, examines perceptions about the value of computer science among key stakeholders in K-12 education, issues of access and barriers to computer science education, and evaluates opportunities for students to become more involved in computer science before college.
Images of Computer Science: Perceptions Among Students, Parents and Educators in the U.S. (2015)		
Computing in Afterschool (March 2014)	Melissa Ballard (Afterschool Alliance) & Irene Lee (Project GUTS, Santa Fe Institute)	This presentation from the 2014 National AfterSchool Association annual conference outlines several popular computer science education platforms and highlights the Project GUTS afterschool program.
Computer Science K-8: Building a Strong Foundation (2012)	Computer Science Teachers Association (CSTA)	This compendium of case studies demonstrates the many ways computer science can be implemented with elementary and middle school students.
Computational Thinking: Teacher Resources (2011)	International Society for Technology in Education (ISTE) & the Computer Science Teachers Association (CSTA)	Computational thinking is a problem-solving process learned through computer science education. This guide helps educators understand, value, and implement computational thinking in K–12 education.

	Title	Author	Description
Girls & Computing	Girls in IT: The Facts (2012)	National Center for Women & Information Technology (NCWIT)	*Girls in IT: The Facts* is a synthesis of the existing literature on increasing girls' participation in computing. It provides a clearer and more coherent picture the current state of affairs for girls in computing and the key barriers they face.
	Women Who Choose Computer Science—What Really Matters (2014)	Google	Today, women make up just 18% of computer science degrees, down from 37% twenty years ago. This study help us understand why, and identify the primary drivers that motivate young women to pursue computer science.
	Build IT: Scaling and sustaining an afterschool computer science program for girls (2012)	Melissa Koch, Torie Gorges & William Penuel	This journal article from *Afterschool Matters* examines the need for sustainable, scalable afterschool computer science programs targeting girls and describes the development of one such curriculum.
	Top 10 Ways Families Can Encourage Girls' Interest in Computing (2015)	National Center for Women & Information Technology (NCWIT)	A set of tips to encourage girls to study, and have a career in, computer science and related technology fields. Written for families, but highly relevant for program providers. Also available in Spanish.
National Standards	Next Generation Science Standards (NGSS), specifically the section "Using Mathematics and Computational Thinking"	NGSS Lead States	NGSS reflects how science and engineering are practiced in the real world. Computational thinking is recognized as a fundamental tool in both science and engineering for representing physical variables and their relationships.
	CSTA K–12 Computer Science Standards	Computer Science Teachers Association (CSTA)	This core set of learning standards is designed to provide the foundation for a complete computer science curriculum and its implementation at the K–12 level.
	ISTE Standards	International Society for Technology Education (ISTE)	The ISTE Standards describe the skills and knowledge they need to learn effectively and live productively in an increasingly global and digital society. Currently under re-development, with an expected release date of June 2016.