



TOOLKIT

Why Computer Science Education? A Toolkit for Parents

Candace Brooks and Kim Elliott



Education
Development
Center



Inside the Toolkit

Explore CS Ed facts and action steps to make sure your child is ready to thrive in our wired world and workplaces.

➔ Click on a topic box to learn more.



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School
Learning



OVERVIEW: Why Does Your Child Need a Great Computer Science Education?



Why computer science education (CS Ed)? When we were in school, we had no CS classes. The only computer scientists we knew were in the movies, and they were all white and male. We could not access CS Ed, we could not imagine using CS skills and knowledge in a career, and that set tight limits on our dreams.

We do not want that to happen to your child. We know from our work at EDC that CS Ed helps all students master skills and ways of thinking that are key to success in jobs and in life. We also know that more and more jobs in every industry require CS fluency. Yet many students still have no CS classes, and many students cannot imagine themselves using CS skills and knowledge in a career. That is why we made this toolkit for parents.

We invite you to explore this toolkit to make sure all career doors are open to your child. Helping your child realize their dreams can start today.



Whether your dream is to start a business or to be an astronaut, a background in technology can help —it certainly helped me realize my dreams. We need more of tomorrow's women to learn to code."

Anousheh Ansari,
Co-Founder and Chairwoman, Prodea Systems



Overview



Pathways to College
& Careers

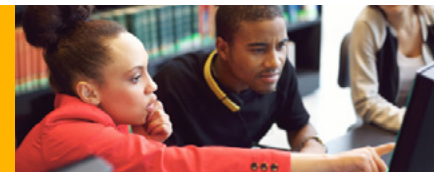


Rebuilding Schools



Out-of-School Learning

Pathways to College & Careers



Why CS Ed Matters



Fast Facts



Learn More



Take Action

The changing work landscape presents incredible opportunities for exciting and rewarding careers. Our job is to make sure that all of our children have the skills and knowledge they need to take full advantage of these opportunities and take the job market by storm.

CS Ed can teach your child to think, create, and solve big problems using technology—preparing them to enter any field of study or career. You play a critical role in encouraging your child to explore CS Ed learning, especially if your child is a girl, a student of color, or a student with a disability.

Research shows that these students, in particular, have a greater chance of succeeding when they have support from parents and teachers, as well as from mentors who look like them and work in CS and STEM fields.



If we can produce a nation of CS-fluent youth, the U.S. has a greater chance at being a global leader in discovery and innovation. We need a strong workforce of young adults who are ready for whatever the future brings.



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Pathways to College & Careers



Why CS Ed Matters



Fast Facts



Learn More



Take Action

1. The U.S. has over [500,000 open technology jobs](#), and code.org notes that these jobs “are in every industry, in every state, and they’re projected to grow at twice the rate of all other jobs.”
2. Seventeen of the 25 highest paying jobs in the U.S. require CS fluency or advanced CS skills and knowledge ([GlassDoor](#)).
3. The College Board found that “[Students who learn computer science in high school are 6 times more likely to major in it, and women are 10 times more likely to major in it.](#)”
4. Although 2016-2017 saw some [significant gains in the numbers of female and minority students taking Advanced Placement \(AP\) computer science exams](#), only “1 in 5 of those taking AP CS were underrepresented minorities and about 1 in 4 were women.”
5. Research led by Gallup for Google and published in the report, [Diversity Gaps in Computer Science](#), found that in computer science, male students are encouraged more than female students. The report also found that although Black and Latino students express more interest in CS than White students, they have less access to CS Ed in school and both groups remain underrepresented in the CS workforce.
6. In 2015, “[women earned only 18% of all computer science degrees.](#)” a substantial decrease from 1984, [when women earned 37% of CS degrees](#). In 2017, Black students accounted for only [8.9% of the 71,000 bachelor’s degrees in CS that were awarded; Latino students attained 10.1% of CS bachelor’s degrees.](#)



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Pathways to College & Careers



Why CS Ed Matters



Fast Facts



Learn More



Take Action

- [Opening Doors to Computer Science Education](#) by Burt Granofsky
- [The Most Important Skill You Can Teach Your Child](#) by Howard Tullman
- [Equity in Computer Science Education](#) by the K–12 Computer Science Framework led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts
- [Mentoring Middle School and High School Girls in Programming](#) by Kim Wilkens and Nancy Bordelon
- [Next Gen Workforce Now: Toward a Nation of Computer Fluent Youth](#) by Joyce Malyn-Smith
- [Student Perspectives of Community College Pathways to Computer Science Bachelor's Degrees](#) by Louise Ann Lyons and Jill Denner
- [Diversity Gaps in Computer Science: Exploring the Underrepresentation of Girls, Blacks, and Hispanics](#) by Google-Gallup
- [Women in Computer Science: Getting Involved in STEM](#) by ComputerScience.org
- [Does Not Compute: The High Cost of Low Technology Skills in the U.S.—and What We Can Do About It](#) by Change the Equation



Overview



Pathways to College
& Careers

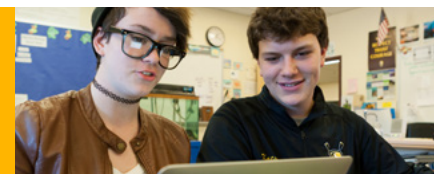


Rebuilding Schools



Out-of-School Learning

Pathways to College & Careers



Why CS Ed Matters



Fast Facts



Learn More



Take Action

There are many “ships”—mentorships, internships, and scholarships—to help your child sail on to exciting CS-related careers. Explore the websites below, and share them with your child. It is never too early to start focusing on the future. In elementary and middle school, you can help your child start thinking about careers that interest them and help them learn more about the skills and knowledge they will need to succeed in those careers. Early in high school, your child will want to apply for mentorships and internships, and set their sights on scholarships.

1. If your child is a member of an underrepresented group, reach out to connect with a group that is working to broaden participation in CS for that group. A few examples follow: [The Alliance for Access for Computing Careers](#) (students with disabilities); [Computing Alliance of Hispanic-Serving Institutions](#); [Institute for African-American Mentoring in Computing Sciences](#); [American Indian Science and Engineering Society](#); and [National Center for Women & Information Technology](#) (check out their [AspireIT K-12 Outreach Program](#)), and [Computing Research Association-Widening Participation](#).
2. Several tech giants and corporations offer scholarship programs, including [Microsoft](#) and [Google](#). In addition, here’s a list of [50 Amazing Computer Science Scholarships](#) focused on all tech careers—from cybersecurity to graphic communications to information management to manufacturing to advanced programming—and U.S. News has a [helpful article about scholarships that you might want to browse](#).
3. Online hubs hosted by national organizations, states, districts, and schools offer helpful info about how to get started on pathways to CS careers. Just a few of these include: Chicago Public Schools’ [College and Career Links](#); ComputerScience.org’s [Finding a CS Job](#), [Careers in CS](#), and [Scholarships & Financial Aid](#); and ComputerScienceOnline.org’s [Computer Science: The Next Hot Major for Minority Students](#).



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Rebuilding Schools



Why CS Ed Matters



Fast Facts



Learn More



Take Action

Who can predict the challenges—ethical, economic, environmental—that new technologies will pose 30 years from now? Your child needs to be ready to tackle these challenges head on.

All students need to understand how and why tech is changing their world and what those changes mean. Hands-on knowledge of programming, big data, and robotics will prepare them to participate in decision-making about computer science. Students who have no understanding of CS will view new tools as mysterious “black boxes,” and they will be unable to compete in and contribute to a tech-driven world.

Is your PreK–12 school system giving all students an outstanding CS education? Weaving CS learning into the PreK–12 school day is the best way to make sure that students gain CS fluency. Yet today only 40% of schools teach CS. It is time to rebuild schools.



“ All of today’s kids will need—along with reading, writing, and arithmetic—a basic understanding of computation and the role that it plays across a wide range of disciplines. Coding is engaging and empowering. It’s a necessary 21st Century skill.”

- Jan Cuny, Program Officer, National Science Foundation



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Rebuilding Schools



Why CS Ed Matters



Fast Facts



Learn More

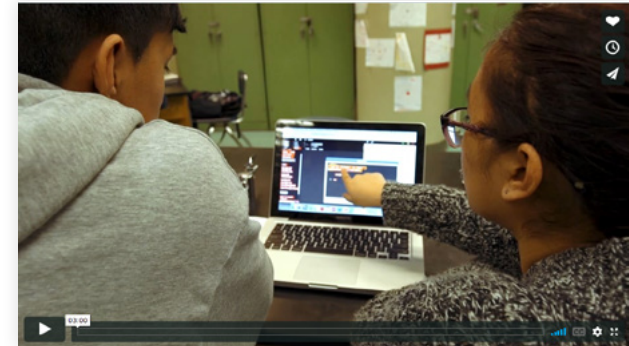


Take Action

[A 2017 report written by EDC, Code.org](#), and other partners explains what it will take to rebuild schools to make sure all students can access CS Ed learning that prepares them for their futures. Even great courses, like EDC's and Berkeley's AP course [Beauty and Joy of Computing](#) (check out the video at right), and training teachers, are just part of the solution. To rebuild schools, we need to create strong CS Ed systems.

Rebuilding schools will take:

1. A state plan for K–12 education
2. State-level initiatives to address diversity in computer science education
3. Adoption of K–12 computer science standards
4. State-level funding for computer science education
5. State-approved teacher preparation programs at colleges/universities
6. A requirement for all high schools to offer computer science
7. Allowing computer science to satisfy a high school graduation requirement
8. Allowing computer science to satisfy a core admission requirement at postsecondary institutions



VIDEO: Beauty and Joy of Computing



Overview



Pathways to College
& Careers

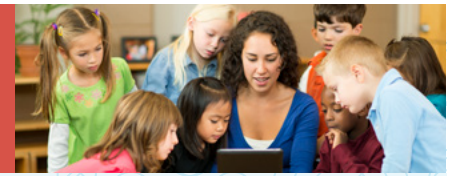


Rebuilding Schools



Out-of-School Learning

Rebuilding Schools



Why CS Ed Matters



Fast Facts



Learn More



Take Action

- [State of the States Landscape Report: State-Level Policies Supporting Equitable Computer Science Education](#) by Jim Stanton, Lynn Goldsmith, W. Richards Adrion, Sarah Dunton, Katie Hendrickson, Alan Peterfreund, Pat Yongpradit, Rebecca Zarch, Jennifer Dounay Zinth
- [The Case for Improving U.S. Computer Science Education](#) by Adams Nager and Robert D. Atkinson
- [What Most Schools Don't Teach](#) by code.org (video)
- [Computer Science Education: Preparing Informed Decision-Makers and Innovators](#) by Jim Stanton
- [Should All Children Learn to Code?](#) by Burt Granofsky
- [A Push to Boost Computer Science Learning, Even at an Early Age](#) by Eric Westervelt
- [On the Program for K-12: Computational Thinking](#) by Burt Granofsky
- [American Schools Are Teaching Our Kids How to Code All Wrong](#) by Idit Harel
- [Computational Thinking from a Dispositions Perspective](#) by Chris Stephenson and Joyce Malyn-Smith
- [Thinking Like a Computer Brings Wide Learning Benefits](#) by Shawna De La Rosa



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Rebuilding Schools



Why CS Ed Matters



Fast Facts



Learn More



Take Action

Recent studies have found that although **93% of parents want their child's school to teach computer science**, only **40% of schools teach it**. Here are some things that you can do:

- 1. Explore** [Facebook's Tech Prep](#), [CSforAll Consortium](#), [Code.org Advocacy Group](#), and [National Center for Women & Information Technology](#) for great ideas on how to promote CS Ed, advocate for rebuilding schools, and find CS Ed opportunities for your child. Feel free to contact them for advice and to find ways to connect with other parents who are interested in rebuilding schools. Check out these pages, in particular:
 - **TechPrep: [Parents & Supporters](#)**—Great tips and strategies, user-friendly info about coding, and helpful ideas to get your child interested in CS.
 - **National Center for Women & Information Technology: [Moving Beyond Computer Literacy: Why Schools Should Teach Computer Science](#)**—Strong talking points on the importance of rebuilding schools to integrate CS and computational thinking.
 - **Code.org Advocacy Group: [Promote Computer Science](#)**—Join over 1.78 million people in signing a petition, download great fact sheets, explore stats, great infographics, and more.
- 2. Share this toolkit** with fellow parents, teachers, school and district leaders, community leaders, school board members, and staff from your [state education agency](#).
- 3. Find more facts** to strengthen the case for rebuilding schools on [Google for Education's Computer Science Education Research hub](#). Topics include improving CS Ed in rural communities and unconscious bias in the classroom. Google for Education often adds new reports from their studies.



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Out-of-School Learning



Why CS Ed Matters



Fast Facts



Learn More



Take Action

Your child's learning does not end when the last bell of the school day rings. A lot of rich learning happens outside of school—at home, in the community, in afterschool programs, in museums, you name it.

Today, about 10 million students take part in out-of-school learning programs, and African American, Hispanic, and children from low-income families are more likely to participate in these programs. Out-of-school learning does not take the place of rebuilding schools and creating strong PreK–12 CS Ed systems. Yet out-of-school learning programs can play a powerful role in reaching children and youth whose schools do not provide CS Ed and sparking their interest in computer science.

There also are a lot of things you can do to support your child's CS learning at home and in the community. Why not explore CS with your child and “crack the code” together?



“ Out-of-school time programs that mobilize and effectively coordinate resources have increased student engagement and interest in future endeavors in computing.”

- Irene A. Lee and Fred Martin, in *The SAGE Encyclopedia of Out-of-School Learning*



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Out-of-School Learning



Why CS Ed Matters



Fast Facts



Learn More



Take Action

Computer science is being taught in many settings outside of the traditional classroom. Just a few of these include libraries, clubs, science and art museums, community centers and organizations, “bootcamps” (which are super-focused workshops and trainings)—as well as summer and afterschool programs. Research shows that these out-of-school learning experiences that enrich learning and connect peers in a relaxed atmosphere are especially important for the following groups of students:

- **Students living in rural areas and small towns**, who are less likely to have computer science taught in their schools as compared to urban and suburban kids.
- **Black, Hispanic, and low-income students**, who are less likely to have access to CS classes in their schools. African-American students, in particular, are more likely to learn CS in groups outside of school than in school.
- **Girls**, who are less likely to seek out computer science opportunities or to learn computer science on their own.



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Out-of-School Learning



Why CS Ed Matters



Fast Facts



Learn More



Take Action

- [Growing Computer Science Education in Afterschool: Opportunities and Challenges](#) by Afterschool Alliance
- [Why Summer Matters](#) by National Center for Afterschool and Summer Enrichment
- [How I Started An Afterschool Code Club](#) by Douglas Tarr
- [Out-of-School Time Programs Boost Students' Engineering, Computing Skills](#) by *Youth Today*
- [Computer Science For All—Computer Not Required](#) by You for Youth
- [STEM Resources for Girls](#) by New Mexico Out-of-School Time Network
- [Computer Science Education Week](#)
- [Google CS First](#)
- [Girls Who Code](#)
- [Techbridge](#)



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

Out-of-School Learning



Why CS Ed Matters



Fast Facts



Learn More



Take Action

Check out the following resources to help your child explore computer science at home and in your community.

1. [CS Unplugged](#): You and your child can learn computational thinking by doing hands on activities without using a computer. Chock full of activities that will demystify computer science in a fun and engaging way. (In Finland, [all kids learn computer science without computers!](#))
2. [The Connector](#): This website identifies out-of-school science, technology, engineering and math learning opportunities around the country. Search for programs by the child's age, type of opportunity, and topic.
3. [Maker Faire](#): Engage your child in the local "maker" scene in your area. Maker Faires are gatherings for people of all ages to come together, create things—many involving computer science—and play.
4. [MIT App Inventor](#): Do you have a child that just can't wait to learn to code? Check out the MIT App Inventor for tutorials and get started.
5. [The Clubhouse Network](#): Check out this global out-of-school program for kids 10 to 18 years. The network has 100 clubhouses in 19 countries around the world. Students can explore web design, programming, video game design, and creating 3D models.
6. [Technovation](#): If you have a daughter that wants to learn how to build apps, sign her up for the Technovation Challenge! Each year, teams of girls from around the world learn how to code and create apps that address problems in their own communities. Finalists pitch their ideas to a panel of experts.
7. [Speak the Language\(s\)](#): Take a tour of programming languages so you can share them with your child. Find out about [7 Free Programming Languages to Teach Kids How to Code](#). Worried about which programming language is "the best"? According to one programmer, "[The Programming Language Doesn't Matter](#)."



Overview



Pathways to College
& Careers



Rebuilding Schools



Out-of-School Learning

