



Computer science is for everyone

A toolkit for middle and high schools to increase diversity in computer science education



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Introduction

We live in a world that is rapidly evolving, with technology tightly intertwined in life, in school and at work. Learning computer science (CS) helps people better understand our technology-enabled world. It positions students for high-demand jobs and provides them with skills that are broadly applicable — illuminating new approaches to problem-solving, critical thinking and creativity.

Schools across the country and around the world are working to increase access to quality CS education. But while CS classes and opportunities are expanding, too many students — especially girls, Black, Latino and Native American youth — feel like it's not for them. As a result, the whole world misses out on the diverse perspectives needed to fuel innovation and drive change.¹ The insights and tools in this kit will help ensure all young people understand the value of a CS education and feel welcomed and empowered to succeed.

What is Computer Science?

Computer science, or “CS,” is a very large subject. It blends all the “STEM” subjects of science, technology, engineering and math, and also includes design. It's important for students to learn these skills because computer science is everywhere. By increasing access to CS for all youth as early as possible, we help them prepare for the jobs of today and tomorrow. This education gives them the opportunity to become the world's next innovators.

Why engage girls in CS?

Ideas in computer science are shaping our world and solving some of its biggest challenges. The people who work in this industry should be as diverse as the world they are shaping. And when girls are introduced to the impact and creativity involved in CS careers, their perspective on them changes dramatically.

Jobs that rely on knowledge of computers are also in high demand. People who major in CS in college can earn 40 percent more money than the average college graduate.²

By 2026, there will be an estimated 3.5 million computing-related jobs open in the United States. However, only 17 percent of these jobs are expected to be filled by graduates of U.S. colleges and universities.³

These patterns present a prime opportunity for teachers and parents to help girls and young women learn about and prepare for these high-demand, high-reward careers. And make no mistake: You can make a difference!

“A career in CS is a chance to build things. If you can dream it, CS can help you do it!”

— Alice Steinglass, President, Code.org

1. Girls in IT: The Facts. National Center for Women & Information Technology, 2012. www.ncwit.org/sites/default/files/resources/girlsinit_report2012_final.pdf.
2. Career Earnings by College Major. The Hamilton Project, 2014. www.hamiltonproject.org/charts/career_earnings_by_college_major/.
3. By the Numbers. National Center for Women & Information Technology, 2018. www.ncwit.org/bythenumbers.

What can you do?

Research commissioned by Microsoft in 2017 tells us that girls want to be creative and create change in the world, but many don't realize CS can give them the opportunities to do just that.

The research, which included an extensive review of existing studies, interviews with subject matter experts, and a quantitative survey of more than 6,000 girls and young women from ages 10 to 30, reveals five insights you can turn into action:

Provide role models so girls and young women can see themselves in the field. For example, invite female CS professionals to talk to students about their work and show them the possibilities of CS. Be mindful to reflect a diverse range of women in terms of race, ability, gender expression and careers.

Generate excitement with a steady narrative about how CS careers are creative and critical to solving real-world problems. (See <http://makewhatsnext.com/careers/>.) Put up posters and displays that highlight the creative possibilities in CS.

Provide hands-on experiences so students can better understand what CS is all about. Introduce immersive lessons and learning experiences, take field trips to local companies, and offer “learn by doing” apps, games and other tools. Be sure that you consider the transportation and other needs of girls and students with fewer resources.

Provide encouragement. Girls who are encouraged in CS by a parent or teacher are more likely to say they'll study CS. Actively support girls who show an interest in CS. Talk with parents about the role of CS in future careers and the importance of support and encouragement at home. And provide school counselors with info and resources for supporting girls in CS. (See <https://www.ncwit.org/project/counselors-computing-c4c>.)

Encourage a “growth mindset” by treating questions, discovery and even failure as positive parts of the learning process. (See www.ncwit.org/resources/ncwit-tips-8-ways-give-students-more-effective-feedback-using-growth-mindset-0.)

We invite you to adopt some of these specific ways you can achieve greater diversity in CS. Then share these resources with other education leaders as you educate and inspire the next generation of computer scientists.

“Closing the gender gap isn't up to the students alone. It's up to us — to change our behaviors, strategies and systems so that these classes and careers reflect the diversity in our communities.”

— Dr. Brad McLain, Senior Research Scientist, National Center for Women and Information Technology

Getting started

Your voice is important

Teachers and guidance counselors are some of the best ambassadors for engaging girls in CS classes and activities. Encouragement can make a big difference in young women's interest in STEM — especially when it happens both at school and at home.

Our research shows that when girls are encouraged by teachers and parents, they're more than twice as likely to consider studying CS in high school and three times more likely to say they'll study it in college compared to girls who get no encouragement from either a parent or teacher.¹

Putting this toolkit to use

- **Recruitment Roadmap.** Use this roadmap to plan your school's activities for the year as you lead up to class registration.
- **Newsletter and social media content.** Use these to communicate your goals to the entire school community and solicit their support in helping achieve them.
- **Computer Science + You.** Print out this section and give it to young women, leave copies in the guidance counselor's office, and share with parents on occasions like Back to School night.
- Explore the **Additional Resources** section for more information on increasing gender diversity in CS.

¹ Closing the STEM Gap. Microsoft, 2018. <https://aka.ms/girls-in-stem-research>.

“Teaching in a more diverse classroom, both by gender and ethnicity, allows more higher-order questions and discussions to happen. It’s also fun to teach a diverse classroom.”

— Mary Davison, Career and Technical Education Director, Seattle Public Schools



Recruitment roadmap

Countdown to registration!

To increase the diversity of students in CS classes, be intentional about your goals and create a plan. This includes setting clear benchmarks, identifying your audience, determining the best ways to reach them, and including others who share your goal and can collaborate with you.¹

Consider the following steps when creating your plan and add your own steps to customize recruitment for your school!

6 months before registration

- **Review targeted recruitment strategies** and best practices at www.ncwit.org/geset.
- **Convene a committee** to focus on increasing diversity in CS classes. Members may include (but needn't be limited to) a parent, a teacher, a student government representative, and a district leader.
- **Working with your stakeholders, set two to three SMART (specific, measurable, attainable, relevant and time-bound) goals** to increase diversity in your school's CS classes for the following year. Example: *"This year, we've set a goal to increase the number of girls and underrepresented youth in our computer science classes by 10%."*
- **Explore the curated set of resources available** to support CS student recruitment in the Additional Resources section of this toolkit.

5 months before registration

- **Begin communicating your goals** to teachers, guidance counselors, parents and students. Use the sample email/newsletter copy provided in this toolkit!
- **Identify students** to target for recruitment.
- **Consider a school-wide awareness event** prior to class registration. This could be a community-wide Hour of Code celebrating **Computer Science Education Week** (which happens in December) or a computer science fair showcasing the work of previous students. Convene a planning committee. See www.hourofcode.com/us/how-to.

4 months before registration

- **Include a CS presentation** during curriculum night. This can help parents understand why CS is important for all students and help students understand that CS really is for everyone. Print out the Computer Science + You section of this toolkit (pages 13-16) and give it to parents to take home.
- **Send an update to school staff** on your recruitment plan and next steps. Let them know how they can help.

3 months before registration

- **Begin promoting your school-wide awareness event.** Whether it's an Hour of Code, CS Fair or school assembly, include opportunities for girls to demonstrate the cool things they've built with computers and to interact with female role models.
- **Use suggested social media posts** in this toolkit or your own messages to encourage girls to take part in an Hour of Code or CS in general. Accompany your posts with images we've provided or, even better, photos of your own students.

Keep in mind:

International Women's Day is March 8. Plan ahead for ways to celebrate women in CS leading up to and during this important date!

2 months before registration

- **Keep promoting your event** through social media, in newsletters and by word of mouth.
- **Hang inspiring posters** in hallways, the counselor's office, and art, drama and music spaces. CS is creative too!

1 month before registration

- **Hold your community recruitment event**, CS Fair or assembly.
- **Reach out to teachers, parents and students** via social media posts, newsletter articles and letters home, paying close attention to the girls who attended your CS events. See the Additional Resources section of this toolkit for ideas.



Class Registration!

1 month after registration

- **Look at the numbers.** Did you meet your goal? If so, keep up the good work! If not, identify the barriers and make an action plan for overcoming them. Don't get discouraged! Any progress that increases diversity is worthwhile.
- **Keep the conversation going** through your school's communication channels once the class has started. (Example: Show a diverse set of students at work. Keep it fun and engaging!) Check in with your students and instructors to see how they are doing and ask for their feedback.

1 What are the Important Components of Targeted Recruiting? National Center for Women & Information Technology, 2010. www.ncwit.org/geset.

Plug-and-play tools

- School email or newsletter example
- Social media guidance
- 4-page printable pamphlet to give to students and parents

To send to students

Instructions: Personalize the sample letter, email or newsletter copy below to inform students about the opportunities they have with computer science.

Subject line: Computer science is for everyone!

Dear students,

It's almost class registration time! Every subject we offer is extremely valuable. But we want to make sure you know about one subject in particular: computer science.

Computer science, or "CS," is one of the newest and most creative subjects in any school. You get to build and design different programs and learn about things like the games and apps people use every day on our phones. People who do computer science as a career are involved in every industry out there, from music and film production to healthcare and environmental work.

A lot of students think CS is meant for only certain types of students. But that isn't true! To get started in CS, the most important things to have are a desire to solve problems and a willingness to explore new ideas.

People interact with technology every day. CS is your chance to look at it from the inside.

So as you're thinking about which classes to sign up for, think about CS. We have more materials on the subject if you want to learn more about it. And you can always come to talk to me or your teachers.

Have fun choosing your classes, and I look forward to see you in them soon (maybe in CS class!).

Sincerely,

[Insert your name and contact info]

To send to teachers and counselors

Instructions: Personalize the sample letter, email or newsletter copy below to communicate your school's CS diversity goals and how teachers and counselors can support them.

Subject line: Let's increase gender diversity in computer science

Dear team,

As we approach class registration time, I want to draw your attention to an important opportunity: increasing diversity in our computer science classes.

Computer science (CS) is one of the fastest-growing career fields of the next decade, and it offers tremendous opportunity for solving some of the world's greatest challenges. Yet women, Black, Latino, and Native American youth will continue to be underrepresented in these jobs unless we encourage them as students now.

You can make a tremendous difference in the lives of our female students. When girls are encouraged by teachers and parents, they're more than twice as likely to consider studying CS in high school and three times more likely to say they'll study it in college than girls who get no encouragement from either a parent or teacher.

In short, all of us — whether we teach computer science or not — have the chance to connect girls with powerful, creative knowledge that can change their lives and the world! Even if girls don't choose CS careers, a background in CS will help them in almost any other job and industry as well.

Our school has set a goal to have **[insert your SMART goal here, if your school has one]** more girls enrolled in CS classes by this time next year. And we need your help to get there!

Here are five ways to boost the participation of our female students in CS classes and activities:

1. **Provide role models** so a variety of different kinds of girls can see themselves in the field.
2. **Generate excitement** about the creativity and potential for impact in CS.
3. **Provide hands-on experiences** with coding and CS.
4. **Provide encouragement** and demonstrate your confidence in their ability.
5. **Encourage a "growth mindset."** Young women are willing to work hard to succeed.

Together, let's ensure all our students have the opportunities and encouragement they need to learn CS and see it as a viable path for study or a future career.

Sincerely,

[Insert your name and contact info]

To send to parents

Instructions: Personalize the sample letter, email or newsletter copy below to inform parents about how CS might be a good fit for their daughters.

Subject line: Computer science is for everyone!

Dear parents,

As we approach class registration time, I want to draw your attention to an important opportunity: increasing the diversity of the students who participate in our computer science (CS) classes.

Girls strongly identify with opportunities to be creative and have an impact on the world. CS gives them that opportunity! We live in a world that is rapidly evolving, with technology tightly intertwined in life, in school and at work. Having your child learn CS will help them better understand our technology-enabled world. It will put them in a good position for high-demand jobs and provide them with skills that are broadly applicable — illuminating new approaches to problem-solving, critical thinking and creativity.

Help ensure your child is prepared for the jobs of the future. Computer scientists create everything from websites to the software used in producing music and films. Ideas in computer science are involved in solving some of the world's most pressing challenges, from monitoring global disease prevention to protecting endangered species.

We want to connect your children with the opportunities that will fulfill them, and we know you do too. Simple acts can go a long way, such as offering words of encouragement and taking a minute to talk with students about computer science careers and what they have to offer.

In short, we're all part of the team that has a remarkable opportunity: to connect young people with powerful, creative knowledge that can change their lives and the world! Even if girls don't choose to pursue a CS career, a background in CS will help them in almost any other job and industry as well.

Here are five ways to help girls and young women give computer science a try:

1. **Provide role models** so your daughters can see themselves in the field.
2. **Generate excitement** about the creativity and potential for impact in CS.
3. **Provide hands-on experiences** with coding and CS, either at home or through clubs in school.
4. **Provide encouragement** and demonstrate your confidence in their ability.
5. **Encourage a "growth mindset."** Young women are willing to work hard to succeed.

You can read more about these tips in this action guide: <https://aka.ms/stemactionguide>.

Please join us **[at curriculum night, community hour of code, CS Fair]** to hear more about the opportunities a CS education offers for all young people.

Sincerely,

[Insert your name and contact info]

Guidance on social media posts

Consider using Facebook, Twitter, your school's website or other channels like student governments, clubs and newsletters to share information and encouragement about CS.

Your posts should:

- Remind staff, students and parents that your school has CS classes and activities — and let them know how to sign up.
- Reiterate that CS is collaborative, open to everyone, and challenging but doable!
- Reflect the creativity and problem-solving potential of CS.

Do you have a student "influencer"? Ask them to share their story, post to social media platforms and engage in your school's recruitment efforts.

Suggested posts:

Painter, musician, computer scientist — there are lots of ways to be creative! Encourage students to sign up for computer science and explore their creativity! #CS #STEM

Did you know that a computer science major can earn nearly 40% more than the average college grad? Try CS today! #CS #STEM

Computer scientists are needed to solve some of today's toughest challenges including global warming, food scarcity and disease. Try CS to learn how! #CS #STEM

Images:

Choose images that capture attention and drive excitement. Show a diverse array of female students or role models, and aim for a fun, inspiring and positive tone. The goal is to showcase youth and creativity, so be bold with colors and focus on people and faces. No need to show a device in every photo!

When possible, use images of your own students. These "near peer" examples help girls more clearly see the possibilities for themselves in CS.

Here are some examples of the kinds of images that work best!



Printable pamphlet instructions

The next four pages are to be printed out (front/back if possible) to create a two-page handout that can be distributed to students.

Make these handouts available in whatever way works for your school. Here are some suggestions:

For example:

- Give them to guidance counselors to share with students they meet with.
- Leave a stack in the main office.
- Give to teachers so they can pass them on to students who might be interested.

Computer science + you

If you like:

- Problem-solving
- Teamwork
- Creativity
- Doing good for the world

... then guess what: You'll probably like computer science!

What is computer science?

Computer science, or "CS," is a very large subject and it is often difficult even for computer scientists to define. It has been said, though, that "computer science is the study of what machines can do for us."

CS blends all the "STEM" subjects of science, technology, engineering and math. Doing computer science involves all of those subjects, as well as design.



Why does it matter?

Technology is changing the world. By learning CS, you can be part of those changes.

By 2026, there will be an estimated 3.5 million jobs related to computing open in the U.S. We need people like you to fill them!

Whatever industry you end up working in, computers are going to play a part. Knowing the basics can help nurture your creativity and prepare you for any type of career.



Computer science + you

Why should I try it?

Computing is a field where you can dream big. It's constantly evolving, and people who know the basics of CS can build on their interests to collaborate and achieve big dreams.

CS is creative.

Many CS careers require creative thinking, such as figuring out how to turn a small idea into a full-blown website. Technology is also instrumental in creative industries like music and film. CS skills and ideas are needed to create CDs, DVDs, internet broadcasts and file downloads.



CS is important.

You can use CS to find innovative solutions to the world's most pressing issues, including:

- Documenting rising ocean levels.
- Monitoring global disease prevention.
- Working with farmers to collect data that will increase the global food supply.
- Making it easier to communicate with people around the world, even those who speak other languages.
- Breaking down barriers for people with disabilities.

You don't have to be a math whiz to learn CS.

Math skills are important in many jobs. But as a beginning computer scientist, what you really need to be good at is exploring new ideas, solving problems and stretching your brain skills that everyone has! The best way to see if CS is a good fit for you is to try it.



Computer science + you

What can you do with CS knowledge?

Computers and technology are behind some of the most interesting and impactful jobs out there today. Studying CS can point you toward any number of cool careers:

- **Fashion tech designer** — Creates wearable technology and ways for customers to shop and preview clothing and accessories online.
- **Mobile developer** – Programs apps and experiences that people use on their phones.
- **Medicine analyst** — Helps prevent injury and study medical treatments.
- **Data scientist** – Studies large amounts of data to help governments and businesses make decisions.
- **Defense expert** – Protects an organization’s information and systems against hackers and computer viruses.
- **Music program engineer** – Develops the tools that people use to record and produce music.
- **Software or web developer for a nonprofit** – Designs programs and websites for organizations taking on disease, poverty, injustice and other big problems.
- **Computer model engineer** – Creates simulations to predict and explore events and patterns in weather, astronomy, human health, economics and other areas.



Computer science + you

Where can CS take you?

Computer science + you = a bright future. Not only does it open the door to all sorts of amazing careers, but it also gives you skills that are in very high demand.

People who major in CS in college earn 40 percent more than the average college graduate.¹ How's that for an exciting future?

1. Career Earnings by College Major. The Hamilton Project, 2014. www.hamiltonproject.org/charts/career_earnings_by_college_major/.

Learn more!

Code.org: studio.code.org/courses

Girls Who Code: www.girlswhocode.com

NCWIT Aspirations in Computing:
www.aspirations.org

What other girls say about CS:

"I love having the ability to design out-of-the-ordinary web designs, so I need to learn everything about computers now in high school."

"You're basically building something that you want with coding. It's really cool to create whatever you want that way."

Where do I start?

Sign up for a CS class:

Course name(s): _____

For info: _____

Join a computing club:

Club name(s): _____

For info: _____

Contributors

Special thanks to the nonprofit and academic experts who contributed to this guide and work every day to close the gender gap in STEM and CS.



Since 2009, Technology Education and Literacy Schools (TEALS) has helped hundreds of high schools across the United States to build and grow sustainable CS programs. By pairing tech industry volunteers with classroom teachers, educators learn how to launch or expand CS courses for their students and help close the skills gap.

tealsk12.org



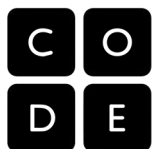
NCWIT is a nonprofit community of more than 1100 organizations that convenes, equips, and unites change leader organizations to increase the meaningful participation of all women – at the intersections of race, ethnicity, class, age, sexual orientation, and disability status – in the influential field of computing, particularly in terms of innovations and development.

ncwit.org



The Computer Science Teachers Association (CSTA) is a membership organization that supports and promotes the teaching of computer science. CSTA provides opportunities for K-12 teachers and their students to better understand computer science and to more successfully prepare themselves to teach and learn.

csteachers.org



Code.org® is a nonprofit dedicated to expanding access to computer science in schools and increasing participation by women and underrepresented minorities. Code.org organizes the annual Hour of Code campaign which has engaged 10% of students worldwide.

code.org



CsforALL's mission is to make high-quality computer science an integral part of the educational experience of all K-12 students and teachers and to support student pathways to college and career success.

csforall.org

Additional resources

Support student recruitment and retention

Aspirations in Computing: www.aspirations.org

AspireIT: A K-12 Outreach Initiative for Girls:
<https://www.ncwit.org/project/aspireit-k-12-outreach-initiative-girls>

NCWIT Counselors for Computing (C4C) resources for school counselors, including fliers, slides and more: www.ncwit.org/project/counselors-computing-c4c

8 tips to encourage a growth mindset: www.ncwit.org/resources/ncwit-tips-8-ways-give-students-more-effective-feedback-using-growth-mindset

Inspiring videos, posters and more:
<https://code.org/educate/resources/inspire>

Tech student stories:
www.tealsk12.org/students/stories/

Technolochicas, empowering Latinas to create the future with the power of technology:
<https://technolochicas.org/>

Microsoft DigiGirlz technology career exposure:
www.microsoft.com/digigirlz

Tools and curricula

Computer Science Discoveries introductory CS course: <https://code.org/educate/csd>

Khan Academy free online courses:
www.khanacademy.org/computing

Microsoft MakeCode open-source platform:
<https://makecode.com>

Minecraft: Education Edition, for students to design, create and code: <https://education.minecraft.net/>

The SCRIPT (Strategic CSforALL Resource & Implementation Planning Tool) csforall.org/script/

Increase access to CS education

TEALS, supported by Microsoft Philanthropies, helps high schools build and grow sustainable CS programs: www.tealsk12.org

Boys & Girls Club of America Computer Science:
www.myfuture.net/computer-science

Girls Who Code Clubs:
www.girlswhocode.com/clubs/

Free camps and workshops at Microsoft stores:
www.microsoft.com/en-us/store/locations/events-for-students

NCWIT Enrich Pk-8 computing education resource guide: www.ncwit.org/enriched

Code.org teacher workshops: www.code.org/professional-development-workshops

More information

Microsoft Closing the STEM Gap Research:
<https://aka.ms/girls-in-stem>

NCWIT Girls in IT: The Facts:
www.ncwit.org/resources/girls-it-facts

Girls Who Code: Cracking the Code research:
<https://girlswhocode.com/crack-the-code/>

Computer Science Teachers Association:
www.csteachers.org/



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We're investing our greatest assets — our technology, people, grants, and voice — to advance a more equitable world where the benefits of technology are accessible to everyone. Technology should be an equalizing force in the world, not one that drives people further apart. Through our philanthropic investments and partnerships, we are working to create a better future that everyone can share in.

Find more resources to close the STEM gap at aka.ms/girls-in-stem

For information about Microsoft's diversity and inclusion programs: microsoft.com/diversity

For more information about Microsoft Philanthropies, please visit: microsoft.com/philanthropies

