

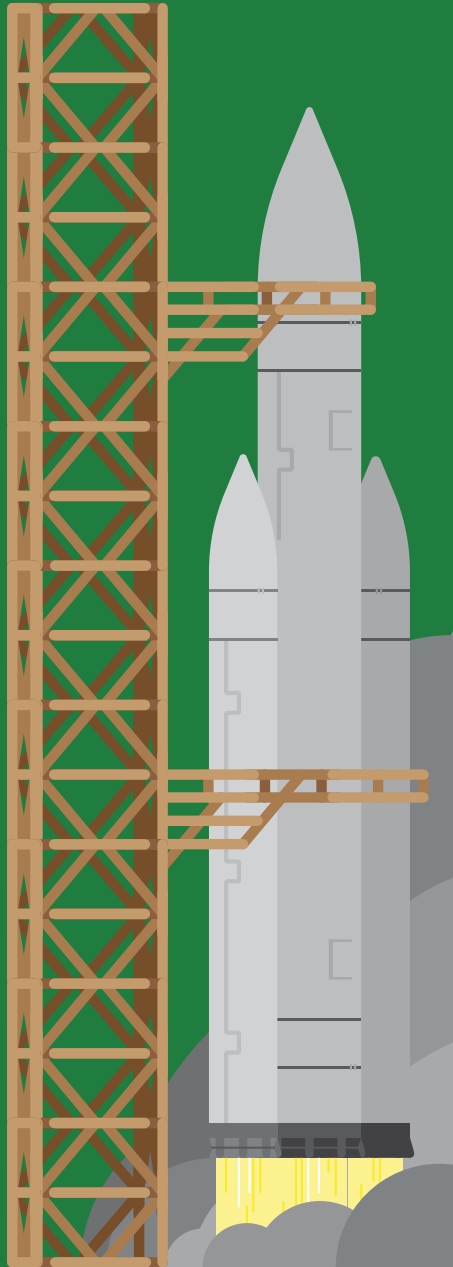
An action guide to help close the gender gap in STEM



"A career in computing gives you a chance to build things. Websites, apps, games, graphics ... If you can dream it, computer science can help you do it!"

– Alice Steinglass, President, Code.org

Introduction



Careers in science, technology, engineering and math (STEM) and computer science (CS) are critical in shaping the world we live in and solving some of its biggest challenges. Unfortunately, despite the high priority placed on these subjects in school, only a fraction of girls and women are likely to pursue them. By the time they're in college, for example, 58 percent of female students believe that jobs that require programming and coding are "not for them." As long as half the population is less than fully represented in STEM and CS fields, we will miss out on the diverse perspectives needed to drive innovation and solve today's toughest problems.

The good news is that there are steps we can all take to help close the gender gap in STEM and CS.

Microsoft commissioned a survey of over 6,000 girls and young women and conducted interviews with nonprofit and academic experts. We compiled the findings in an [online report](#) — and here we present what we learned in a simple guide for teachers, parents, and education and nonprofit leaders.

“Closing the STEM 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.”

Brad McLain,
National Center for Women and Information
Technology (NCWIT)

The research pointed to five categories for taking action:


- **Provide role models.** Girls and young women have a hard time picturing themselves in STEM roles. Seeing women who work in STEM and technology helps remind girls they have a place in these fields if they want it.
- **Generate excitement.** Girls want to be creative and have a positive impact on the world. Many don't realize that STEM and computer science careers can give them exactly the opportunities they're looking for!
- **Provide hands-on experience.** Girls who participate in STEM clubs and activities outside of school are more likely to say they will pursue STEM subjects later in their education. In addition to increasing access to STEM and CS clubs, we can bring the experiential learning that girls want into more classrooms.
- **Provide encouragement.** Girls who feel supported by teachers and parents show more interest in continuing with STEM and CS learning in their future.
- **Encourage a "growth mindset."** Girls are willing to work hard to succeed. So we need to create environments where questions, discovery and even failure are treated as positive parts of the learning process.

When girls are engaged and supported, they're excited about the possibilities STEM and CS offer. For more information on closing the gender gap in STEM, go to microsoft.com/girls-in-stem.

Acknowledgments

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:

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- [Ed Lazowska](#), Computer Science and Engineering, University of Washington
- [Colleen Lewis](#), Associate Professor, Harvey Mudd College
- [Brad McLain](#), Researcher, NCWIT
- [Reshma Saujani](#), Founder and CEO, Girls Who Code
- [Dr. Linda J. Sax](#), Principal Investigator, BRAID Research (Building, Recruiting, and Inclusion for Diversity), University of California Los Angeles
- [Alice Steinglass](#), President, Code.org



“You can apply STEM and computer science to all kinds of careers. By learning those subjects today, you’re setting yourself up for success in any field.”

– Miriam Brady, Microsoft Philanthropies TEALS Program

Girls in STEM: What education and nonprofit leaders can do

“When teachers set high expectations for their students and also provide a great deal of encouragement and support, everybody does better.”

– Maria Klawe
President, Harvey Mudd College

The gender gap in science, technology, engineering and math (STEM) and computer science (CS) fields is wide and longstanding. To close it will take practical and cultural shifts in the ways that these subjects are taught and presented.

However, even small shifts can make a big difference. And no school or nonprofit is alone: If you’re committed to helping more girls and young women find a future in STEM, you’ll find yourself in very good company.

Provide role models

- Identify [female STEM professionals](#) who are interested in talking to students about their work.
- Use moments celebrated in your school and community (Pi Day, Earth Day, Women’s History Month, etc.), to ensure women in STEM and computer science are well represented.

Generate excitement

- Read the [research](#) on closing the STEM gap.
- Use the plug an play resources in the CS [Student Recruitment Toolkit](#) to help ensure your STEM and CS classes reflect the demographics of the larger school population.
- Keep up a steady narrative about the [creativity and relevance to real-world problems of STEM and CS careers](#).
- Share the latest news with your community by signing up for a [newsletter](#) or reading relevant [blogs](#).
- Decorate your facilities with [posters and displays](#) that highlight the creative possibilities in STEM subjects.

Provide hands-on experience

- Introduce STEM and [computer science](#) at an early age.
- Introduce [immersive lessons and learning experiences](#) that all students will love.
- Offer STEM clubs and activities in your district or organization, and encourage participation in local nonprofits that offer these activities:
 - [Girls Who Code](#)
 - [Boys & Girls Club of America](#)
 - [Girl Scouts in STEM](#)
- Propose and encourage field trips to science centers and STEM-related museums.

Provide encouragement

- Empower teachers and group leaders with STEM and [CS professional development](#).
- Support girls, and all students, who show an interest in CS with this [Guide to Inclusive Computer Science Education](#).
- Ask fellow leaders in your organization what’s being done to support girls in STEM. By simply asking what your organization is doing, you could spark a conversation among senior leaders that could result in progress.
- Provide school counselors with [info and resources](#) for supporting girls in CS.

Encourage a growth mindset

- Coach teachers and group leaders to support all aspects of the learning process — including questions and even failures.
- Explore different models for adding computer science to existing [schools](#) and [nonprofit programs](#).
- Offer “learn by doing” [apps, games and other tools](#).
- Reach out to [schools and organizations](#) that are already making headway in closing the STEM gap.

Girls in STEM: What teachers can do

“One of our biggest goals should be educating students about the countless ways that STEM knowledge and skills can change the world for the better.”

– Dr. Linda Sax
Principal Investigator, BRAID Research, UCLA

Educators are invaluable when it comes to encouraging girls to explore science, technology, engineering and math (STEM) knowledge and careers. With hands-on activities and clear connections between STEM subjects and real-world jobs, girls can learn more than the material — they can embrace the process of learning itself.

Here are some actions teachers can take to help close the gender gap in STEM.

Provide role models

- Invite [female STEM professionals](#) to visit your class.
- Inspire students with [videos and posters](#) featuring female role models.
- Find and share articles about women and [students who are pursuing STEM](#).
- Use moments in time celebrated in your school and community (Pi Day, Earth Day, Women’s History Month, etc.), to ensure women in STEM and computer science are well represented.

Generate excitement

- Check out the [Women in Tech Lesson plans from Girls Who Code](#).
- Use the plug and play resources in the CS [Student Recruitment Toolkit](#) to help ensure your STEM and CS classes reflect the demographics of the larger school population.
- Explore the [cool and important jobs](#) that people do with STEM knowledge.
- Find a [DigiGirlz Day](#) or take your students to a free workshop at a [Microsoft Store](#).
- Teach an [Hour of Code](#) in your classroom [or go deeper](#).

Provide hands-on experience

- Prioritize hands-on learning experiences like [MakeCode](#) to highlight the creative and problem-solving aspects of CS.
- Engage students with [experiments and activities](#) connected to real-world problems and situations.
- Let students know about STEM- and computer-related clubs, camps and activities outside of class:
 - [DigiGirlz Camps](#)
 - [YouthSpark Camps](#)
 - [Girls Who Code Clubs](#)
- Discover [free learning activities](#) that teach computer science without a computer.

Provide encouragement

- Read stories about [other young people](#) your students can relate to.
- Keep an eye out for girls losing interest in STEM subjects and find out why.
- Talk with parents about the role of STEM knowledge in [future careers](#) and the importance of support and encouragement at home.
- Get your STEM on! Your enthusiasm for the subject matters.

Encourage a growth mindset

- Empower girls to ask questions about the material and its relevance to their lives.
- Show your own growth mindset! Start a [Girls Who Code club](#) — you don’t need to be a techie!
- Let students know they don’t need to have the right answer right away. The important thing is seeking it out and discovering it!

Girls in STEM: What parents can do

“Be brave. Be innovative. Science and technology are taking on big challenges — and we need girls to help solve them.”

– Reshma Sujani
Founder and CEO, Girls Who Code

Teachers aren't the only ones in a position to motivate girls in science, technology, engineering and math (STEM). [Research shows](#) that when girls are encouraged by both a parent and a teacher, they're more likely to remain engaged in STEM and see themselves in a STEM career someday.

Have a daughter? Here are a few things you can do to inspire and support her interest in STEM subjects!

Provide role models

- Introduce your daughters to women you know who work in STEM or computer fields (or seek one out).
- Let your daughters know when you come across [female STEM professionals](#) in the news.
- Find groups and events outside of school where girls have the chance to meet STEM professionals:
 - [DigiGirlz Camps](#)
 - [Girls Who Code Summer Immersion program](#)
- See if your daughters are interested in [movies](#) and [books](#) that depict women and girls achieving amazing things with STEM knowledge.

Generate excitement

- Talk about the [cool and important jobs](#) that people do with STEM knowledge.
- Explore how STEM and [computer science](#) careers are creative and help the world.
- Let your daughter see firsthand what a career in tech is like at a [DigiGirlz Day](#).

Provide hands-on experience

- Try a fun [STEM activity or experiment](#) over the weekend or at a slumber party.
- Take your daughters to a STEM-related museum.
- Introduce your daughters to STEM and computer-related clubs, camps and activities outside of school:
 - [Code.org classes](#)
 - [YouthSpark Camps](#)
 - [Girls Who Code](#)
 - [Boys & Girls Club of America](#)
 - [Girl Scouts in STEM](#)

Provide encouragement

- Ask your daughters what they think of their STEM classes and why.
- Give them your attention and support when they express interest or curiosity about science or computers.
- Put an [inspiring poster](#) on the fridge or somewhere else in the house.

Encourage a growth mindset

- Show your own growth mindset! Start a [Girls Who Code club](#) — you don't need to be a techie!
- Let your daughters know they don't need to have the right answer right away. The important thing is seeking it out and discovering it!

Resources

Here are just some of the organizations helping close the gender gap in STEM.

Boys & Girls Clubs of America

For more than two decades, Microsoft has partnered with Boys & Girls Clubs of America (BGCA) to build technology centers and bring digital skills training to youth.

Learn more at bgca.org

BRAID

The BRAID (Building, Recruiting, and Inclusion for Diversity) initiative is co-led by AnitaB.org and Harvey Mudd College. BRAID partners with universities to increase the percentage of women and underrepresented minority students in their undergraduate computing programs.

Learn more at anitab.org

Code.org

Code.org aims to provide computer science to all youth, especially to girls and underrepresented minorities. Code.org organizes the annual Hour of Code campaign, which has engaged 10 percent of all students in the world.

Learn more at Code.org

DigiGirlz

DigiGirlz is a Microsoft YouthSpark program that gives middle and high school girls opportunities to learn about careers in technology, connect with Microsoft employees, and participate in hands-on workshops.

Learn more at microsoft.com/digigirlz

Girls Who Code

Girls Who Code works to inspire, educate and equip girls with the computing skills to pursue 21st-century opportunities. For the last five years, Microsoft has provided funding and served as a host site for Girls Who Code Summer Immersion Programs across the U.S.

Learn more at Girlswhocode.com

National Center for Women and Information Technology (NCWIT)

NCWIT is a nonprofit focusing on women's participation in computing by helping more than 1,100 organizations connect female students in K-12 and higher education with industry and entrepreneurial opportunities.

Learn more at ncwit.org

TECHNOLOchicas

TECHNOLOchicas is a national initiative of the National Center for Women & Information Technology (NCWIT) and Televisa Foundation designed to raise awareness among young Latinas and their families about opportunities and careers in technology.

Learn more at <https://technolochicas.org/>

TEALS

Technology Education and Literacy in Schools (TEALS) is a program supported by Microsoft Philanthropies that helps high schools build and grow sustainable computer science (CS) programs through partnerships between classroom teachers and tech industry volunteers.

Learn more at TEALSk12.org

For links and other information about closing the gender gap in STEM, go to microsoft.com/girls-in-stem.

Resources

Here are some of the programs and tools you can use to help close the gender gap in STEM.

Programs

Microsoft DigiGirlz:
microsoft.com/digigirlz

Microsoft DigiGirlz Camp:
<https://www.microsoft.com/en-us/diversity/programs/digigirlz/hightechcamp.aspx>

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

Boys and Girls Club of America science and tech programs:
<https://www.bgca.org/programs/education>

Girl Scouts in STEM:
<https://www.girlscouts.org/en/our-program/our-program/stem.html>

Code.org courses:
<https://studio.code.org/courses>

Coding classes:
<https://code.org/learn/local>

Code.org teacher workshops:
https://code.org/professional-development-workshops?utm_source=ptnredu&utm_campaign=po

Clubs through Girls Who Code:
<https://girlswhocode.com/clubs/>

Start your own coding club:
https://girlswhocode.com/start-a-club/?_ga=2.160666237.1357200519.1522787360-1861769450.1520908515

Technology career exposure:
<https://www.microsoft.com/en-us/diversity/programs/digigirlz/digigirlzday.aspx>

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

Tools and Curricula

Microsoft STEM education lessons and apps:
<https://www.microsoft.com/en-us/education/products/education-apps/default.aspx>

Learn Computer Science with Minecraft:
<https://education.minecraft.net/>

Find STEM role models:
<https://education.microsoft.com/skype-in-the-classroom/find-guest-speakers>

Inspire kids to pursue computer science:
<https://code.org/educate/resources/inspire>

CS Unplugged Teaching Materials:
<https://csunplugged.org/en/>

STEM activities for the home or classroom:
<https://thestemplaboratory.com/stem-activities-for-kids/>

Information

Microsoft Closing the STEM Gap:
<https://www.microsoft.com/en-us/digital-skills/girls-stem-cs>

NCWIT newsletter:
<https://www.ncwit.org/itnews>

NCWIT blog:
<https://www.ncwit.org/blog>

STEM-related entertainment and toys:
<https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE1UEVo>

STEM-related books
<https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE1UEVn>

STEM-related careers
<http://aka.ms/codecreators>

CS-related careers
<https://code.org/careers-in-tech>

Tech student stories:
<https://www.tealsk12.org/students/stories/>