

The Impact of Girl Scout STEM Programming



A 2022 Report from the
Girl Scout Research Institute



The Gender Gap in STEM

Science, technology, engineering, and math (STEM) are critical to solving today's problems. Overcoming challenges like natural disasters, poverty, cyberwarfare, climate change, and declining resources will rely on people employed in STEM fields to provide a comprehensive view of the problems along with specialized knowledge and the vision to help build a better future.

As a result, there has been exponential growth in STEM occupations; over the last thirty years, employment in STEM occupations has grown 79% and is projected to continue to grow. Despite this rapid growth, women remain vastly underrepresented in the STEM workforce, in holding STEM degrees, and in opportunities to develop STEM interest as youth.

- Women comprise about half of the total workforce but only 34% of the STEM workforce and have lower median salaries than their male counterparts.
- At the collegiate level, women hold the majority of bachelor's degrees overall (57% in 2019) but a significantly smaller share of STEM bachelor's degrees (39% in 2019).

The gender gap is perpetuated by gender stereotypes, male-dominated STEM culture(s), and the gap in female role models. To address the gender gap in STEM requires starting early and investing in STEM opportunities for girls.

The Girl Scout STEM Difference

For over 100 years, Girl Scouts has taken the lead in providing opportunities to girls to discover, connect, and take action through STEM. Starting with the Electrician badge in 1916, Girl Scouts has provided fun, hands-on, and educational STEM activities to girls, facilitated by supportive adult volunteers. For decades, Girl Scouts has been innovating in extracurricular STEM education through programs aimed at increasing girls' interest, confidence, and competence in STEM and helping girls understand the value of STEM (i.e., the Girl Scout STEM outcomes). And from 2017 to 2021, GSUSA launched over 100 new STEM programs and Girl Scouts earned over 3.5 million STEM badges.

In Girl Scouts, girls experience science, technology, engineering, and math through engaging activities that relate to their interests to impact the world. Our programs give girls the training, mentoring, and hands-on experiences to help them understand the value of STEM to society and the options for their own related career paths. Girls see how STEM activities and careers are relevant to them through engaging activities like building a robot to solve problems in Robotics, programming an avatar in Digital Game Design to help their community, and using shapes and numbers to create nature-inspired art in the Math in Nature badges.

Get started on these STEM activities and more at [girlscouts.org/STEM](https://www.girlscouts.org/STEM).

Learn [about Girl Scouts](#) and [explore badge activities](#).

Prior research demonstrates the impact of STEM in Girl Scouts: Girl Scouts are more likely than non-Girl Scout girls to be interested in STEM careers and topics—including app development, robotics, coding, and cybersecurity, and Girl Scouts maintain their interest in STEM throughout adolescence, while non-Girl Scout girls' interest decreases after middle school.

Through Girl Scouts, girls develop important STEM competencies critical for the next generation of STEM leaders. Girl Scout STEM outcomes are reinforced through

Girl Scout STEM program activities and reflect attitudes, skills, and behaviors that are consistent with the priorities of the larger youth STEM out-of-school time education community and important to long-term STEM engagement and careers. For the first time, we examined Girl Scouts' participation in STEM programming and assessed their development of the four Girl Scout STEM outcomes at the conclusion of the year and measured the impact on Girl Scouts' interest in future STEM activities, education, and careers.

Girl Scout STEM Outcomes



1. STEM Interest: positive affect and curiosity towards STEM

A girl who is interested in STEM is fascinated by STEM subjects, enjoys participating in STEM activities, and wants to engage, know, and learn more about STEM. She also strives to understand how things work. In the long term, youth who develop a strong interest in STEM are stronger students, more academically engaged, more confident in their STEM abilities, and more likely to take STEM courses and pursue careers in STEM.



2. STEM Confidence: feelings of self-efficacy in relation to STEM

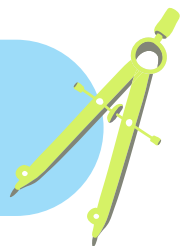
A girl who is confident in her STEM abilities believes she can do most STEM activities well and successfully. Confidence is important because it heavily influences how people approach goals, tasks, and challenges—like trying out innovative ideas, saying “yes” to opportunities, setting the bar high, and stretching their limits to learn and grow. As with STEM Interest, people who are confident in their STEM abilities have higher academic goals and aspirations and are more likely to pursue STEM courses and careers.

3. STEM Competence: ability to think scientifically when working to solve a problem



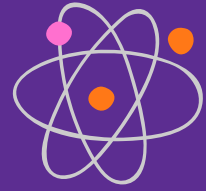
A girl who is competent in STEM uses scientific thinking to understand the root causes of problems, identifies different ways to solve problems, thinks critically about information, and comes up with new solutions when encountering obstacles. Girls who think scientifically about the world are better positioned for engagement in STEM activities and careers and tackling individual and societal problems.

4. STEM Value: understanding the role STEM plays in everyday life (e.g., being able to fix something in your home) and in making the world a better place (e.g., improving water quality)



A girl who places a high value on STEM believes that STEM knowledge and pursuits are important and relevant to real life and can be used to address societal problems. The more girls understand how critical STEM knowledge is to solving community problems, the more likely they will be to pursue educational opportunities and careers in these fields. Research shows that girls who value STEM see STEM careers as a way to help people and make a difference in the world.

Girl Scout STEM Outcomes Study



To assess the impact of the Girl Scout STEM program, the Girl Scout Research Institute (GSRI) conducted a quasi-longitudinal study of 649 troops and over 1,700 individual Girl Scouts from across the United States. This research measured Girl Scouts' participation in STEM programming over the course of a program year, assessed their development of the four Girl Scout STEM outcomes at the conclusion of the year, and measured the impact on Girl Scouts' interest in future STEM activities, education, and careers. For this report, to generalize the findings to all Girl Scouts, the analysis focused on a subset of the data that consisted of a random sample of membership (514 troops and 1,255 girls).

This study reports on the benefits of Girl Scout STEM programs and activities and yields five key insights, which demonstrate how Girl Scouts engages girls of all ages in STEM activities today and what this means for them taking the lead in STEM in the future.

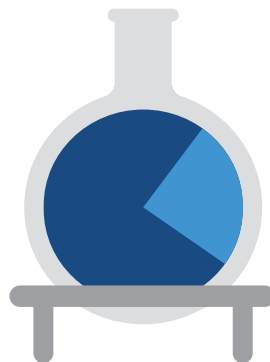
1. Girl Scouts is successfully engaging girls in STEM.

Two-thirds of Girl Scouts (67%) are doing STEM programs—and the majority are doing multiple activities.

Girl Scout Participation in STEM

67%

Two-thirds did STEM programs or activities. This includes 51% who did multiple activities—on average, 3 activities per girl.



33%

Did not do STEM

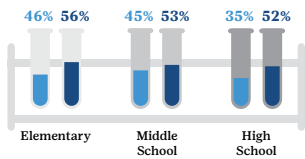
2. Doing just one Girl Scout STEM activity makes a difference!

Findings show that for Girl Scouts of all ages, doing at least one Girl Scout STEM activity during the troop year resulted in higher levels of STEM interest, confidence, and value of STEM to society at the end of the year compared to Girl Scouts who did no STEM activities. Additionally, doing multiple STEM activities further increases girls' understanding of the value of STEM to society.

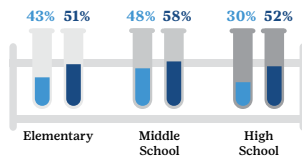


- **STEM Interest:** Girls are excited about STEM subjects and want to learn more.
- **STEM Confidence:** Girls have confidence in their STEM skills and abilities.
- **STEM Competence:** Girls think scientifically to solve problems.
- **STEM Value:** Girls understand the importance and relevance of STEM.

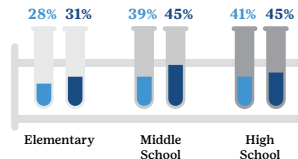
STEM Interest*



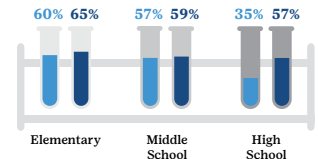
STEM Confidence*



STEM Competence

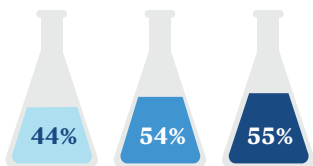


Value of STEM*

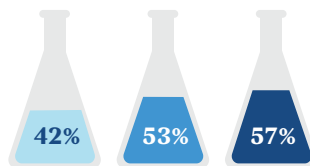


■ NO STEM ■ STEM * p=>.01

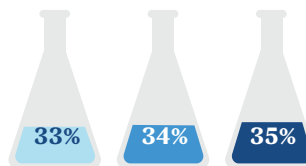
Percentage of Girl Scouts Developing STEM Outcomes



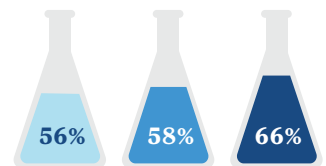
STEM Interest*



STEM Confidence*



STEM Competence



Value of STEM*

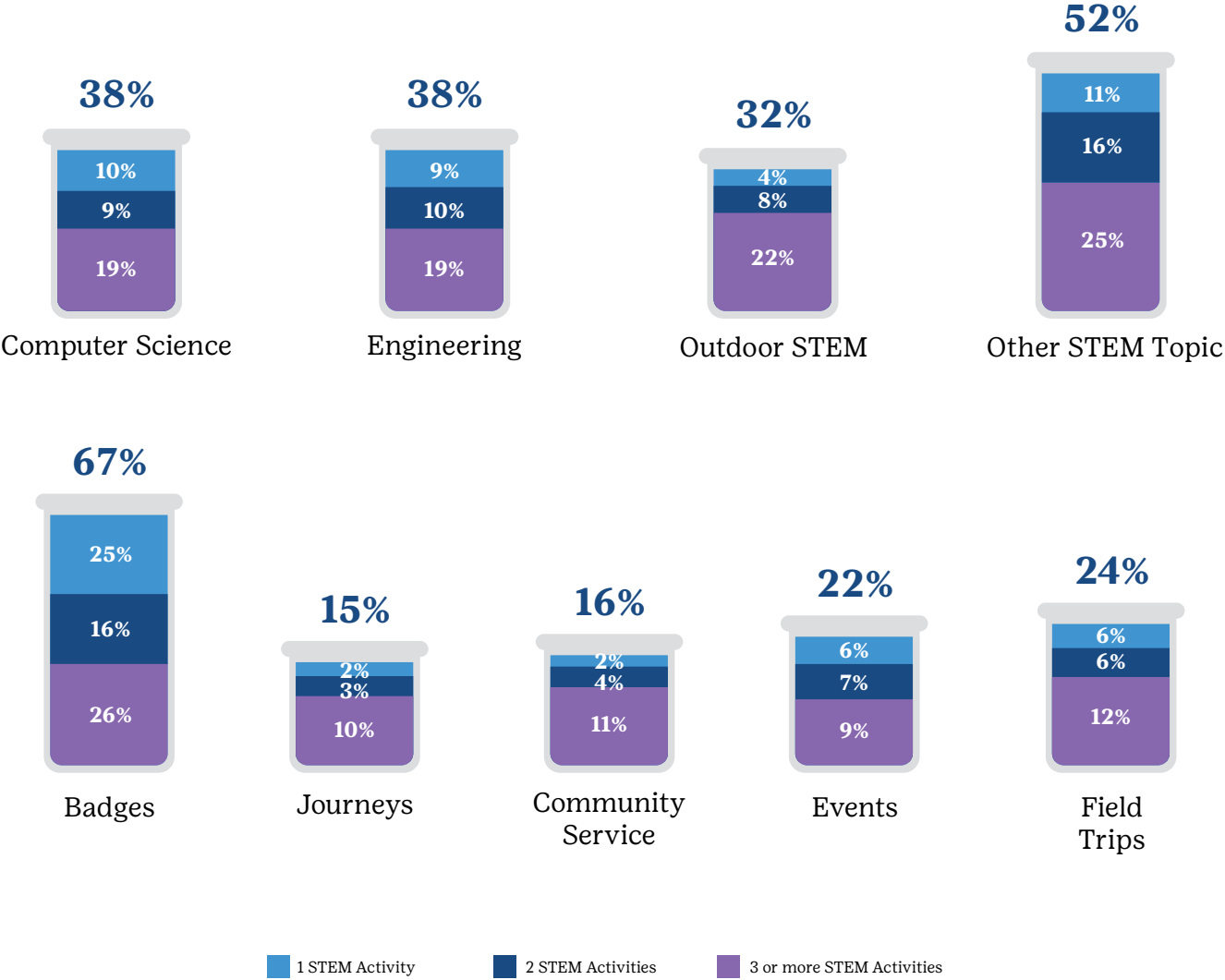
■ NO STEM ■ 1 STEM Activity ■ 2 or more STEM Activities * p=>.01

3. Girl Scouts is connecting girls to a variety of STEM experiences.



Girls' STEM experiences covered topics from computer science to engineering, outdoor STEM, and more, including events and trips alongside Girl Scout National Programs (badges and Journeys). Through experiencing a variety of STEM programs, Girl Scouts can discover their interests and passions.

Percentage of Girl Scouts Engaging in Each STEM Topic



4. Girls find Girl Scout STEM programs fun and educational!

Research shows that having fun and participating in hands-on activities is important for youth to become engaged with and find interest in activities, especially STEM activities. The data show that Girl Scouts does just that! More than nine in ten Girl Scouts from kindergarten through high school had fun doing STEM with Girl Scouts.

- 95% of girls who did Girl Scout STEM activities thought they were fun.
- 93% said they had opportunities to learn by doing, not just listening.
- 91% tried activities they had never done before.
- 88% said they learned a lot about STEM through Girl Scout STEM programs.
- 88% want to do more STEM activities.



Girls' favorite Girl Scout STEM activities:

"I liked Backyard Science Night with the telescopes because seeing the moon through the telescope was cool." (Daisy)

"I liked the activity where we talked about the solar system and used cookies to demonstrate the moons. It was my favorite because I learned a lot about the moon shapes and the planets! I got to eat the cookies too!" (Brownie)

"I liked making my own car out of supplies, and powering it with balloon air was different than I thought it would be." (Junior)

"[I liked] designing 'habitats' for different animals using limited materials given to us, and seeing if the 'habitats' could withstand wind and water." (Cadette)

"Observing the chemical reactions in candy making was very hands-on and left me with a good taste in my mouth." (Ambassador)

5. The Girl Scout STEM experience is cumulative.

Compared to Girl Scouts who do not engage in Girl Scout STEM activities, more Girl Scouts who engage in STEM programming become interested in taking more STEM classes and having a career in STEM. Additionally, the more frequently girls do STEM in Girl Scouts, the more likely they are to be interested in future STEM education.

- 75% of Girl Scouts in middle and high school who did multiple STEM activities were interested in taking STEM classes in college, compared to only 50% among those who did not do STEM activities—a difference of 25 percentage points!
- 63% of Girl Scouts in middle and high school who did multiple STEM activities aspire to a career in STEM, compared to 43% among those who did not do STEM activities—a difference of 20 percentage points!

The formula is simple, but the impact is huge.

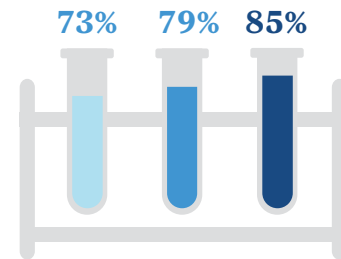
An accepting environment + supportive adults + a variety of fun and hands-on STEM experiences = girls who see the value of STEM and who have the interest, confidence, and competence to take the lead!

This research shows that engagement in Girl Scout STEM programs is linked to the development of the Girl Scout STEM outcomes and girls' interest in future STEM pursuits. Girl Scout STEM programs offer girls the opportunity to learn about themselves and the world around them through a variety of activities. Whether they are creating and programming a robot, building a fairy house, or becoming a citizen scientist by adding cloud observations to a national research project, Girl Scouts provides countless opportunities for girls to explore STEM careers that connect to their passions.

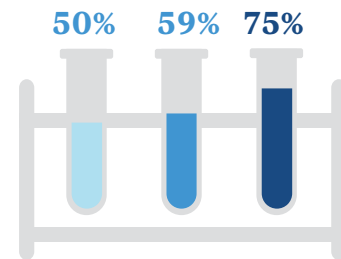


Girl Scout Future STEM Interest by Engagement in STEM

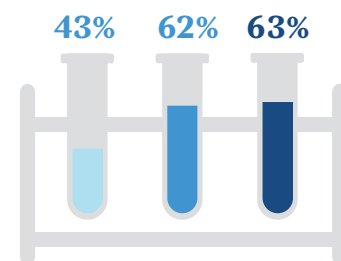
Want to take more STEM classes



Want to take more STEM classes in college*



Want to have a career in STEM*



■ NO STEM ■ 1 STEM Activity ■ 2 or more STEM Activities

* Taking STEM classes in college or having a career in STEM questions were only asked of 6th–12th graders

Methodology

This study consisted of consecutive monthly online troop leader surveys deployed October 2019 through June 2020. Troops (n=649) were recruited through local councils that advertised for troops to participate in a STEM study (n=135). Due to the impact of COVID-19 on participation in Girl Scouts, this report only focuses on Girl Scout activities that occurred between October 2019 and March 2020.

Additionally, to ensure that the results were representative of all Girl Scouts, the sample for this report includes 514 troops and 1,255 girls who represent the random sample of membership.

Surveys asked troop leaders to record troop activities each month. Surveys were also administered to girls in June 2020, soliciting feedback on their year in Girl Scouts and administering the STEM outcomes surveys (see below for additional information).

Girl Scout Characteristics

		Random membership sample (n=1,255)
Age	Elementary School	72% (n=899) 17% Daisy, K-1st grade 34% Brownie, 2nd-3rd grade 20% Junior, 4th-5th grade
	Middle School	20% (n=252) Cadette, 6th-8th grade
	High School	8% (n=104) 6% Seniors, 9th-10th grade 2% Ambassadors, 11th-12th grade
Region		29% Central 28% Northeast 24% South (14% Southeast 10% Southwest) 18% West 1% Overseas
Girl Scout Race/Ethnicity		3% Asian 2% Black 8% Hispanic or Latina 4% Multi-racial 2% Other 81% White



Girl Scout STEM Outcomes Measurement

Girl Scouts measures four outcomes through participation in Girl Scout STEM programming (see [“Four Ways Girl Scouts Builds Girl Leaders in STEM”](#)). To develop the outcomes, GSUSA partnered with The Learning Activation Lab at the University of California, Berkeley, to develop and test the psychometric properties of the STEM outcome measures. The STEM outcomes measures were tested with over 4,000 Girl Scouts of various ages. This included testing multiple versions of items for each outcome to identify the most valid measures and collecting observation information from adults administering the measures to ensure that girls understood the questions. The full STEM Outcomes Survey of 14 questions has a Flesch-Kincaid reading grade level of 3.8.

Each STEM outcome measure asks, “How much is this like you?” or “How much do you agree with each statement?” followed by 3–5 statements. All response options use the same 5-point Likert scale (5 = Exactly to 1 = Not at all).

1. **STEM Interest:** Girls are excited about STEM subjects and want to learn more about them. Three items comprise this outcome (e.g., “I am excited to learn more about science”).
2. **STEM Confidence:** Girls have confidence in their STEM skills and abilities. Three items comprise this outcome (e.g., “I am very good at solving problems”).
3. **STEM Competence:** Girls think scientifically to

solve problems. Five items comprise this outcome (e.g., “When trying to solve a problem, I gather or consider information from different places”).

4. **STEM Value:** Girls understand the importance and relevance of STEM to people and society. Three items comprise this outcome (e.g., “Thinking like a scientist will help me do well in my classes.”)

For each STEM outcome, responses to the survey items associated with that outcome were averaged together to create one overall score, ranging from 1 to 5. Girl Scouts who answered “Don’t Know” to any of the items that make up an outcome measure did not receive an outcome score.

Outcome scores were grouped into one of three categories:

- High scores (4.0 or above) indicated that Girl Scouts possess the beliefs, skills, or attributes associated with the outcome.
- Medium scores (3.0–3.99) indicated that Girl Scouts have begun to develop the beliefs, skills, or attributes associated with the outcome but still have room to grow.
- Low scores (under 3.0) indicated that Girl Scouts do not yet possess the beliefs, skills, or attributes associated with the outcome.

Visit the [Girl Scout Research Institute](#) to learn more about the impact of Girl Scouting and access groundbreaking original research on girls’ leadership and well-being.

[Girl Scout Research Institute](#)

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