



Increasing Visibility

of Women in

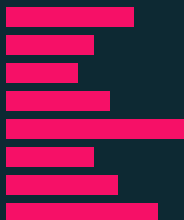


STEM



A 100Kin10 Project Team Collaboration

Fall 2018



**100Kin10** unites the nation's top academic institutions, nonprofits, foundations, companies, and government agencies to recruit and retain 100,000 excellent STEM teachers nationwide, while addressing the underlying challenges that have made the shortage so pervasive.

**Project Teams** are small groups of 100Kin10 partners and invited guests who collaborate on a discrete, time-bound project to address the Grand Challenges underlying the shortage of excellent STEM teachers. The following is a final write up from one such Project Team.

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Section 1

# Introduction

Kids can't be what they can't see. Not enough girls and young women have exposure to women in professional STEM roles, limiting their sense of possibility. Women make up less than 30% of the college-educated STEM workforce even though women exceed men in all other degrees earned (undergraduate, masters, doctorates) as a proportion of the population. But diverse representations of STEM professionals and breaking down STEM stereotypes can dramatically increase the likelihood that women and girls persist and succeed in STEM careers.

### **What is this project about?**

Our project focused on finding resources that encourage diverse women to enter and stay in STEM fields, figuring out what educators find most effective for supporting a young woman's pursuit of STEM education in the classroom, and compiling a list of top classroom strategies for engaging women in STEM.

### **What motivated the work?**

We want our work to create a world where women have equal representation, voice, and influence in STEM fields. We're a group of STEM educators and advocates who believe that the world will be a better place and STEM will be a smarter field with the full contributions of women.

### **What are the project outcomes?**

1. A set of research-backed classroom strategies for supporting more #womeninstem

### **Who will find this project interesting?**

- Teachers and other educators looking for classroom strategies that support young women in STEM .
- STEM education advocates looking for an easy tool to support teachers.
- People who care about the girls and women in their lives.

## How did this connect to one of the “Grand Challenges”?

There is unequal representation of women in STEM fields, and many girls steer away from STEM education early because of discouragement from society or flat-out sexist attitudes. We want to create do-able, step-by-step ways to promote inclusion and engage girls in STEM.

### GRAND CHALLENGE:

The number of women working in STEM fields.

[Learn More >>](#)

## How did the project utilize principles of creating systemic change?

100Kin10 has a hypothesis about what leads to systemic change--they are the **Change Elements** and they are coordinated, direct, diverse, emotionally-resonant, knowledge-based, and measurable.

**Emotionally-Resonant:** Inspiring educators to take up a new idea (in this case a new classroom strategy) can be a big ask. Focusing our work on easy-to-digest visuals that are clear, inspiring, and to the point helps cut through the noise and support more educators in their quest to support women in STEM.

**Diverse:** Our team included a variety of stakeholder voices when defining our final classroom strategies to ensure we had many points of view included and the end product would be relevant and contextually accurate to many different settings.

**Knowledge-Driven:** The strategies presented are supported by research into how girls are influenced by representations of STEM professionals in media, curriculum, and the community to find strategies that improve recruitment and retention of girls to STEM fields.

## Section 2

# Classroom Strategies for Increasing Visibility of Women in STEM

*Skip to Section:*

**Classroom Strategies Overview**

**Strategy 1: Introduce your students to a woman in STEM >>**

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Women make up less than 30% of the college-educated STEM workforce even though women exceed men in all other degrees earned (undergraduate, masters, doctorates) as a proportion of the population<sup>1</sup>. In the workforce, women only hold about a quarter of STEM-related jobs<sup>2</sup> though they earn about half of all bachelor's degrees in science and engineering fields<sup>3</sup>. As careers in STEM fields are high-earning, high-demand careers expected to grow in coming decades, the STEM workforce gap represents a pay and opportunity gap for women.

Diverse representations of STEM professionals and breaking down STEM stereotypes can dramatically increase the likelihood that women and girls persist and succeed in a STEM career<sup>4567</sup>. K-12 educators are well-positioned to tackle the STEM gender gap by increasing the visibility of women in STEM careers and busting STEM stereotypes. The following fun and fulfilling strategies are being used by educators around the country. Dive in!



*"I invite women who are scientists and engineers in the area, as well as women who are currently working on their graduate or undergraduate degrees in STEM, to speak with my students about their jobs or research."*

– Amy,  
Olathe High School Chemistry Teacher



Help us get these strategies in front of educators.

Share them on your own social! **#womeninstem**

[Download image links for social >>](#)

The strategies that follow have two things in common: each has research showing that it is an effective strategy for supporting young girls in STEM, as well as implementation ideas from current educators who are already implementing it with students. Use these strategies with confidence, and share them with others, it takes all of us to make change!



# Introduce your students to a woman in STEM.



*"I think of engineers as boys, but since I met a girl engineer it opens up my life so I can be one."*

*Mya - 5th grader, Washington State*<sup>9</sup>

**Share this classroom strategy on your own social media.**

[View links here >>](#)



**When girls meet a woman STEM expert, they are more likely to believe that they possess the qualities necessary to succeed in that expert's field<sup>8</sup>.**

- [Skype-A-Scientist >>](#)  
Bring a scientist into your classroom through Skype! Over 2,000 scientists willing to chat.
- [Million-Women-Mentors >>](#)  
Connect your students with women in STEM careers.
- [Stanford Science PenPals >>](#)  
Have your students become a penpal with a Stanford scientist.
- [500 Women Scientists >>](#)  
Bring scientific expertise to your classroom.
- **Be the STEM expert!** If you identify as woman, attend workshops and externships where you add to your STEM expertise. If you're an ally to women in STEM, make sure to invite your female colleagues to attend with you.

# Use multimedia that depicts real women in STEM.



*"I display a NASA poster called 'Women of Color,' pass out Kansas scientist cards, and share videos occasionally. I've also invited Society of Women Engineers members to co-teach lessons."*

- Chris, Manhattan, Kansas

**Share this classroom strategy on your own social media.**

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Multimedia that features women in STEM positively influences girls' perceptions of their own scientific and mathematical abilities<sup>10</sup>, multimedia that features primarily men in a STEM field or that perpetuate stereotypes of brilliance or innate ability decrease girls' perceptions of their abilities in that field<sup>11,12</sup>. As you look for multimedia to use in your classroom, start with these exemplary creators and curators of multimedia with equitable representations of women in STEM.

## Multimedia with strong representation of Women in STEM:

- [SciGirls - PBS Kids >>](#)  
SciGirls is a PBS Kids show for kids ages 8-12 that showcases bright, curious real tween girls putting science and engineering to work in their everyday lives.

- [Breakthrough - Science Friday >>](#)  
Mini-documentaries about scientists who are overcoming insurmountable obstacles to pave new paths in STEM with associated lesson plans.
- [Engineering Girl >>](#)  
The Engineer Girl website is designed to bring national attention to the exciting opportunities that engineering represents for girls and women.
- [Changing the Face of Medicine \(NIH\) >>](#)  
Discover the many ways that women have influenced and enhanced the practice of medicine.
- [NASA Women of STEM >>](#)  
Through their accomplishments and dedication to their jobs, women at NASA embody the essence of Women's History Month.
- [The Untold History of Women in Science and Technology >>](#)  
Listen to women tell the stories of their personal heroes across the fields of science, technology, engineering, and math (STEM).
- [Unheard Voices: Multicultural Astronomy and Women In Astronomy \(NASA\) >>](#)  
The contributions of women to astronomy, plus the barriers women have faced and the progress they have made in becoming equal partners in the enterprise of astronomical research.
- [Physics Girl >>](#)  
Youtube channel about physics, astronomy, and science-related topics. The show features fun DIY demos, unusual and cutting-edge research, space, and expert interviews!



# Connect STEM to the real world and the local community.



Share this classroom strategy on your own social media.

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“We do an engineering activity based on the "Mumbai Slumscraper" episode of HBO's "Vice": <https://www.youtube.com/watch?v=8TMKyUdEEMo&t=17m28s>.

Shortly after, we start programming with Scratch, then move to MIT App Inventor, and we revisit Mumbai with this feature on girls who live there and write smartphone apps to improve their lives:

<http://appinventor.mit.edu/explore/blogs/karen/2016/04/tech.html>.”

- Joe, Olpe, Kansas

**Girls are particularly interested in careers that help others or support their local communities, and are more engaged by STEM programs and curricula that highlight how women in STEM play a role in their communities and the real world<sup>1314</sup>. Incorporate relevant media, projects, citizen science, or field trips in your instruction that highlight the connection between STEM and the community.**

## Community-connected STEM programs and curricula:

- [NGSS Hub >>](#)  
The website has over 800 lesson plans, book chapters, videos, and simulations of real-world problem based STEM experiences.
- [National Agriculture in the Classroom >>](#)  
These K-12 resources that bring agriculture into the classroom with project based lesson plans, links to each state program, and virtual visits to farms and food facilities.
- [Chem Matters >>](#)  
A magazine that helps high school students find connections between chemistry and the world around them.
- [Outdoor Biology >>](#)  
Links to 97 activities which encourage environmental awareness in local environments.
- [Earth Science Week >>](#)  
An annual earth-science celebration with lesson plans, citizen science, and multimedia around a rotating real-world theme.
- [NASA wavelength >>](#)  
Resources for Earth and Space K-12 science teachers with links to activities to connect students to their community.
- [The NG Resource Library >>](#)  
Multimedia, non-fiction reading, maps, and lessons featuring inspiring storytelling from National Geographic Explorers
- [SciGirls Connect >>](#)  
A collection of resources connecting science to the real-world.
- [SciStarter >>](#)  
A website that inspires citizen scientists to solve local and global problems.
- [Engineering, Go For It >>](#)  
An interactive website with K-12 lesson plans searchable by topic, articles of current STEM professionals and STEM citizen projects.
- [Teach engineering >>](#)  
K-12 STEM curriculum that follows an engineering design process using real-world examples.
- [Design Squad >>](#)  
A collection of activities and videos empowering middle school kids to solve real-world problems and understand the impact of engineering in a global context.
- [NCTM Illuminations >>](#)  
Standards-based resources, including lesson plans, virtual manipulatives, and

real data to compare to local setting and connecting with students across the world.

#### Classroom Strategy #4

## Provide opportunities for girls to develop relationships around STEM experiences.



Share this classroom strategy on your own social media.

[View links here >>](#)



STEM experiences that provide opportunities to form relationships with women educators, STEM professionals, or other girls are more engaging for women and girls than those that do not <sup>15</sup>.

- [National Girls Collaborative Project >>](#)  
The NGCP brings together organizations throughout the United States that are committed to informing and encouraging girls to pursue careers in STEM. The website provides a program directory, resources for facilitators, and ways to get involved in the effort.
- [STEM For Girls >>](#)  
Providing leadership, expertise, advocacy, and innovation in girls' STEM education.

- [Girls Who Code >>](#)

Free summer programs and after-school clubs for teen girls.

- [Girls Excelling in Math and Science \(GEMS\) >>](#)

GEMS has been working since 1994 to increase interest in STEM for girls in elementary and middle school and to expose girls to the fun and wonder of these fields.

- [SWENext - Society of Women Engineers >>](#)

SWENext is a way to become part of the Society of Women Engineers as a student through the age of 18. Joining is free. Any student 13 or older can become a SWENexter. For those younger than 13, a parent will need to be the primary contact.

- [Black Girls Code >>](#)

A program that supports the involvement of young women of color in programming and technology.

- [Afterschool Universe - NASA >>](#)

Afterschool Universe is an out-of-school-time astronomy program targeted at middle school students.



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