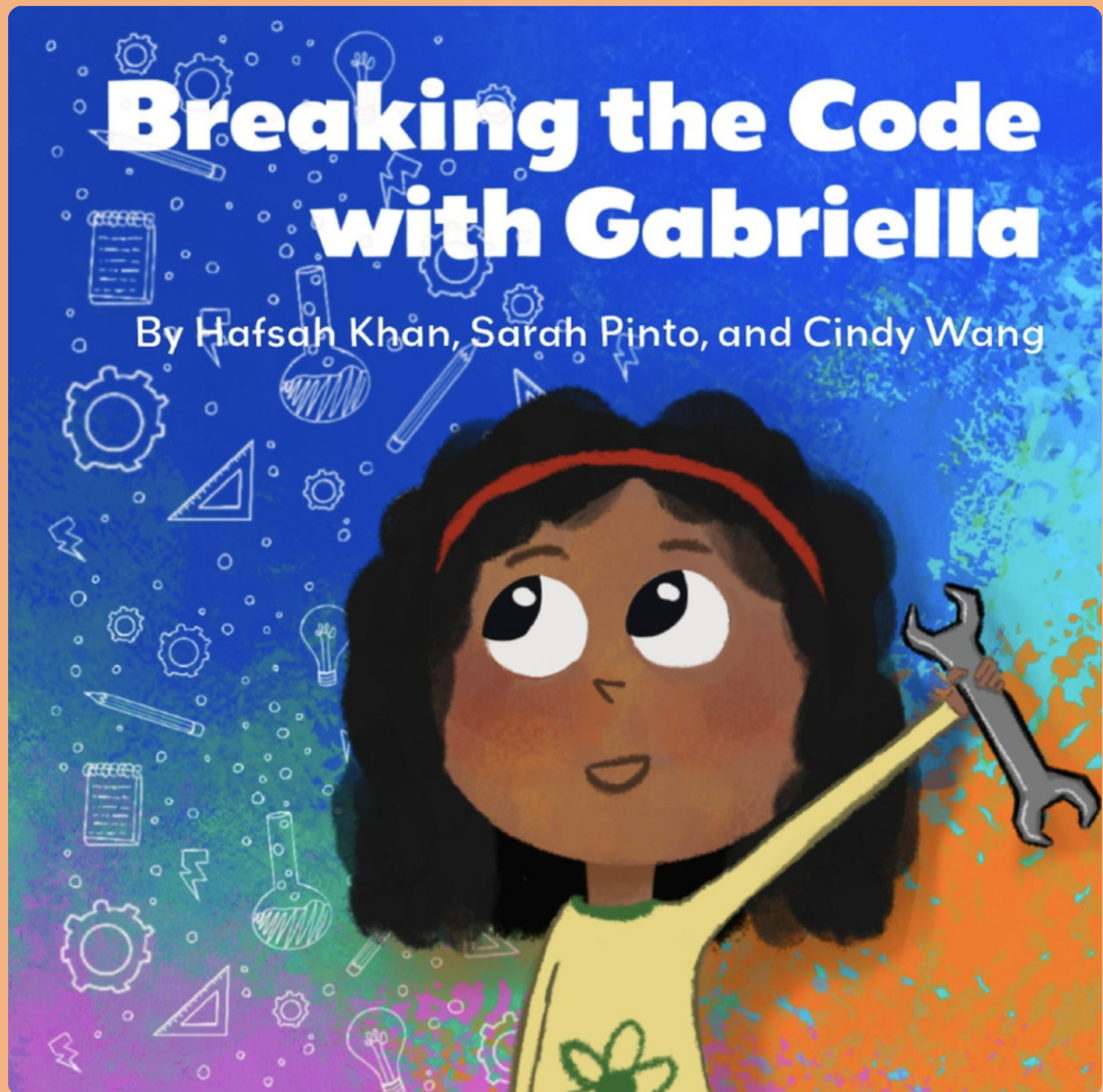


Breaking the Code With Gabriella: a Guide to Using the Book in Your Classroom



How teachers can get the most out of the pro-gender diversity in STEM picture book!

What is *Breaking the Code With Gabriella*?

***Breaking the Code With Gabriella* is a picture book targeted towards children in third through fifth grade.** It follows the story of Gabriella, a young girl who joins her school's robotics team but finds out she's the only female member. As readers follow her journey throughout the robotics season, they'll see how she overcomes gender stereotypes, learns about engineering and coding, and ultimately learns the lesson of perseverance and never giving up in the face of failure.

Meet the Authors!

Hello! We're Hafsah Khan, Sarah Pinto, and Cindy Wang, three high school students who worked together to write and illustrate ***Breaking the Code With Gabriella***. As co-captains of the Barrington 220 Robotics program, we noticed a large gap in the amount of girls participating in Barrington STEM programs compared to the amount of boys. Through *Breaking the Code With Gabriella*, we hope to encourage young girls to join STEM and robotics programs, as well as spread awareness about gender discrimination in STEM.



Hafsah Khan

Hafsah is the illustrator and co-author of *Breaking the Code With Gabriella* and she will be a senior for the 2024-2025 school year. She has been on the robotics team for her entire high school career and is passionate about gender diversity in STEM! Outside of robotics, she teaches art classes to underserved populations.



Sarah Pinto

Sarah is the co-author of *Breaking the Code With Gabriella* and she will be attending Harvard University as a freshman during the 2024-2025 school year. She has also been an active member of the Barrington robotics team. She is currently planning to major in astrophysics and is a three-time NASA intern.



Cindy Wang

Cindy is the co-author of *Breaking the Code With Gabriella* and will be a junior for the 2024-2025 school year. She is the main coder on the Barrington Robotics team. Cindy is also active as a member of the math team and Science Olympiad, and furthers her passion for physics by leading her school's physics club.

***Breaking the Code With Gabriella* serves three purposes for young students:**

- 1. It encourages young girls to participate in STEM/robotics,** especially if they had never considered it before or if they were previously discouraged by factors relating to gender.
- 2. It raises awareness about gender discrimination in STEM.** After conversations with many of our male peers, we realized that many men involved in STEM have no awareness of the gender discrimination women might face in the field. Further, sometimes the people perpetuating stereotypes or acting in a discriminatory manner towards women don't realize the implications or even the malicious nature of their actions. By helping young boys understand the struggles that women face in STEM fields, *Breaking the Code With Gabriella* helps them understand how to be part of the solution, not the problem.
- 3. It contains educational STEM content.** *Breaking the Code With Gabriella* provides brief introductions to physics, coding, and the design process. Additionally, it provides examples of careers in engineering and coding.

Why is *Breaking the Code With Gabriella* Important?

As you may know, the gender gap in STEM is very prominent: despite making up 48% of all workers in the United States, women make up just 27% of those employed in STEM fields [1]. This disparity is also apparent at the collegiate level across multiple fields; for example, in 2020, women were awarded just 25% of the bachelor's degrees and 21% of the doctorate degrees in physics [2].

Where does this gender imbalance begin?

When choosing a college major and during employment, women often “lack self-confidence in their own professional skills and their assertiveness in interactions with male counterparts,” making it more difficult for women to stay in traditionally male-dominated STEM fields [3]. They are also often made to feel that they have chosen the wrong profession for their gender; women interviewed “described misogynist conversations among co-workers [as well as] gender stereotypical expectations of their superiors” [3]. **These interactions mean that STEM-related environments are often plagued with discriminatory statements, whether intentional or not.** Additionally, the lack of self confidence stems from the cumulation of experiences and stereotypes women have been subjected to throughout their formative years, starting as early as elementary school.

How can *Breaking the Code With Gabriella* be an effective solution?

Despite the severity of the problem, not all hope is lost: **due to the increased attention brought to the challenges women face entering STEM fields, outreach initiatives and diversity efforts have allowed the number of women in the STEM workforce to grow even more rapidly than the number of men** [4]. Thus, it is of utmost importance that we continue to spread and promote pro-gender diversity in STEM initiatives, such as *Breaking the Code With Gabriella*.

1. [Women Making Gains in STEM Occupations but Still Underrepresented \(census.gov\)](https://www.census.gov/data/tables/2019/other-reports/2019-08-21-women-in-stem.html)

2. [Statistics on Diversity in Physics | American Physical Society \(aps.org\)](https://www.aps.org/publications/apsorg/getitem?pubID=1076937)

3. [Why is the pipeline leaking? Experiences of young women in STEM vocational education and training and their adjustment strategies | Empirical Research in Vocational Education and Training | Full Text \(springeropen.com\)](https://www.springeropen.com/articles/10.1186/s13293-020-00200-0)

4. [Diversity and STEM: Women, Minorities, and Persons with Disabilities 2023 | NSF – National Science Foundation \(ncses.nsf.gov\)](https://www.nsf.gov/pubs/2021/nsf21001/diversity-and-stem-women-minorities-and-persons-with-disabilities-2023)

How Can *Breaking the Code With Gabriella* Be Implemented Into Your STEM Curriculum?

During the 2023-2024 school year, us three co-authors went to the Barrington 220 elementary schools to do in person read alouds of *Breaking the Code With Gabriella*. We received positive feedback from the STEM teachers and the Barrington 220 superintendent, as shown below, and we hope that our read aloud experience can serve as inspiration for how *Breaking the Code With Gabriella* can be effectively incorporated into your school's elementary STEM curriculum.

This book is suitable for children in **grades three through five**, but we found that fifth grade students were able to best comprehend the book's message and educational content.

We recommend that this book is read at the start of the year, or before any STEM curricula is started. The message of this book will hopefully dispel any stereotypes that students might have about who "should" be involved in STEM, creating a more understanding and welcoming environment for all students as the curriculum progresses. In addition, the educational coding and engineering content provides a suitable introduction for subsequent learning, since it's informational but not too in depth that students will need extensive background knowledge to understand it.

Here's some feedback from our Barrington read alouds!

“ I was so impressed with the central message of this book... Sarah, Cindy, and Hafsah are role models for all of our young students. ”

-Dr. Winkelman, Superintendent of 220 Schools

“ The passion these three girls have for spreading STEM is beyond inspiring, and their drive and dedication shines through in this book. ”

-Mrs. Dowdy, Lines Elementary STEM Teacher

When doing the Barrington read alouds, we tried to make the experience as interactive as possible to keep students engaged. Here are some ways we facilitated student participation and discussion:

Before reading the book:

- 1.** We asked students if they know what STEM is or if they've participated in STEM related activities before.
- 2.** We asked students if they can think of any ways that STEM is involved in their lives.

While reading the book:

- 1.** We asked students if they know certain vocab terms as they come up in the book. Two examples are iteration and mechanism.
- 2.** Before reading the pages that talk about coding and engineering careers, we asked students if they could think of any. We challenged each class to think of fifteen careers total!
- 3.** We skipped the pages introducing the basics of coding/Java during the read alouds. We thought the information might go over students' heads if taught during a read aloud, and we understand that most elementary STEM curricula doesn't include Java. Instead, we recommend encouraging interested students to look at the pages on their own time.

After reading the book:

In order to help students comprehend the message of *Breaking the Code With Gabriella*, we recommend discussing the book and its themes after reading it aloud. **Here are some discussion questions that you can draw inspiration from:**

- 1.** Have you ever felt left out or different from the other people around you? How did it make you feel? What did you do?
- 2.** If you found out that someone was feeling left out in a group of people you're a part of, what would you do? What are some ways you can help this person feel included?
- 3.** Why did Gabriella feel excluded on her robotics team? How did she overcome this challenge?
- 4.** In the book, James is mean to Gabriella. The other team members don't say as many mean things to her, but they don't stand up to James, which is called being a bystander. Why is it important to not be a bystander? If you were on Gabriella's robotics team, how could you stop James from bullying her?
- 5.** What are some times during the book that Gabriella perseveres through challenges? Why is it important that she doesn't give up?

Supplementary Material

Below, we've put together some additional content that can be used alongside *Breaking the Code With Gabriella* to continue to promote gender diversity and student involvement in STEM!

Women in STEM Role Models



Maryam Mirzakhani

Mirzakhani was an Iranian mathematician and the first woman who won the Fields Medal, the most prestigious award in mathematics equivalent to the Nobel Prize. She was a professor of mathematics at Stanford University and said to be "distinguished by determination and relentless questioning." As the first Iranian to achieve a perfect score on the International Mathematics Olympiad, Mirzakhani serves as a pillar of inspiration for young female mathematicians.

Grace Hopper

Hopper was a pioneer in computer science, credited for inventing the first compiler and creating simplified programming languages. She recommended a programming language using English words to improve efficiency in writing code, changing the field forever. Her legacy has inspired a computing conference for young women in STEM, the Grace Hopper Celebration of Women in Computing. To this day, she remains a trailblazer for girls in computer science.



Katherine Johnson

Johnson was an American mathematician whose work was critical in determining trajectories for NASA missions. Her orbital mechanics calculations were essential in the Space Shuttle program and in calculating the trajectory for Alan Shepard, the first American in space. She was awarded the Presidential Medal of Freedom in 2015 and later inducted to the National Women's Hall of Fame. Johnson was featured in *Hidden Figures*, and her legacy continues to empower thousands of girls across the world.

STEM Organizations to Recommend to Interested Students

There are so many ways students can pursue STEM outside of the classroom! If students develop an interest in STEM or robotics after reading *Breaking the Code With Gabriella*, here are a few organizations they might find helpful. Most of the organizations listed below offer free programs and have virtual options!



Girls Who Code

Girls Who Code (GWC) is a nonprofit organization dedicated to uplifting women in STEM through coding programs, clubs, and events for female and nonbinary students. For students in grades 3 to 12, GWC offers clubs, which help students explore programming in a fun and educational environment. These clubs can be a great way for young girls to bond with interested students in a safe environment, as well as for them to gain invaluable experience and knowledge.

For high school students, GWC runs virtual summer programs. They offer both a two-week Summer Immersion Program with synchronous classes, as well as a six-week Self-Paced Program that allows students to dive into technology subjects in their own time.

This support network extends even past high school. For those ages 18 to 25, GWC provides college and career support programs, helping students with interviews, leadership development, and hiring opportunities.



Kode with Klossy

Kode with Klossy, founded by American model Karlie Kloss, is a free coding program for students of underrepresented genders, similar to GWC's summer programs. Kode with Klossy runs both in-person and remote two-week summer programs, held in major cities such as New York City, the Bay Area, and Washington DC. Students can choose to take a variety of classes, such as web development, machine learning, mobile applications, and data science.



FIRST/VEX

There are many ways for young students to begin their journey in STEM, and one of the best is robotics.

Us three co-authors met as part of a FIRST (For the Inspiration and Recognition of Science and Technology) Tech Challenge team. ***FIRST holds a variety of robotics competitions for different age groups.*** This begins with FIRST Lego League (FLL) which serves ages 4 through 16, depending on your region. These teams are anywhere from 2 to 10 members, and students work to design a solution to a real-world problem in the Innovation Project, build a robot for the main game, and most of all, learn critical collaboration skills. In 7th and 8th grade, as well as in high school, students can compete in FIRST Tech Challenge (FTC). FTC participants, together with their team of up to 15 students, build and program robots, but also act as ambassadors of STEM in their community, engaging in outreach throughout the year. Finally, some high school students can also join FIRST Robotics Challenge (FRC). Unlike FLL and FTC, FRC teams have significantly more people, often 30 or more. FRC aims to foster a professional environment for engineering and programming, amplifying the knowledge students gain in FLL and FTC to a higher level.

Another organization that runs robotics competitions across the United States is VEX. For ages 8 to 14, VEX runs a competition VEX IQ, very similar to FLL and FTC.

Regardless of the organization you decide to compete with, there's no doubt that you'll have a truly unforgettable experience!

Breaking the Code With Gabriella: Trailblazers in STEM Speaker Series

As part of our initiative to empower young girls to pursue their interests in STEM, we are running **the Breaking the Code with Gabriella: Trailblazers in STEM Speaker Series**, which explores the careers of women in science, technology, engineering, and math. The series aims to dispel gender stereotypes and aid young students in getting advice on how to pursue their own passions.

To find out more about the speakers interviewed and their path in STEM, visit our website at breakingthecodewithgabriella.com/trailblazers-in-stem-speaker-series, or find us on YouTube at @Breaking the Code with Gabriella.

Helpful Links

[Buy *Breaking the Code With Gabriella* on Amazon](#)

[Buy *Breaking the Code With Gabriella* \(Spanish Version\) on Amazon](#)

[Visit our website for more information about the book and our journey](#)

Thank you for choosing to incorporate *Breaking the Code With Gabriella* into your elementary STEM curriculum!

We appreciate your support and hope your classroom benefits from our book.

Contact us with any questions at breakingthecodewithgabriella@gmail.com.

