

Field Trip Guide

Planning a Successful STEM Experience for Girls



Acknowledgments

Thank you to our role models and our Advisory Board for your help in making this publication possible and making a difference in the lives of girls.

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Field Trip Guide

Everything you need to know about planning a workplace field trip or event that will inspire girls to open their hearts and minds to science, technology, engineering and math.

Contents

Introduction: Before You Get Started
Field Trip Fundamentals
Field Trip Planner: Checklist7
Speaking Tips
Hands-on Activities
Reflection and Evaluation
Case Study: A Field Trip in Action
Field Trip Sample Schedule
Field Trip Checklist

Visit our website for additional resources about field trips and role models. **techbridgegirls.org**

"I also get the sense of fulfillment for myself, to know that what I am doing every day is not in vain. What you do at a major corporation can impact a student; you can give back to the community. I've helped to foster their creativity and curiosity."

– Josetta Jones, Patent Attorney

Techbridge Girls[™] Cares

93% of Techbridge girls say that field trips boosted their interest in STEM.ⁱ

Techbridge Girls inspires girls of color from low-income families to discover a passion for STEM. Through our gender and culturally responsive after-school and professional development program, we empower the next generation of girl innovators and leaders to change the world. Techbridge has served more than 5,600 girls in responsive afterschool and professional summer programs in the San Francisco Bay Area, Greater Seattle and Washington, D.C., and thousands more through collaborations with partners nationwide.

Role Models Matter

Less than 60% of girls ages 14-17 say they know someone in a STEM career."

If you don't know what a bioengineer does, how do you become one? If a girl has never met anyone in a technical career, it's hard for her to imagine herself in that role. By meeting a role model, a girl may realize what her future can hold. Without these interactions and resulting discoveries, girls may never realize the possibilities within a STEM career.



The Field Trip Difference

Women in STEM careers earn 33 percent more than those in non-STEM jobs.ⁱⁱⁱ

Research shows that girls have a strong interest and aptitude for STEM subjects in grade school but this changes around middle school, partly because girls don't see how STEM fits in their world. By taking girls on field trips to meet STEM women in the workplace, you help them see firsthand that there are opportunities and that they can belong.

Before You Get Started

Make Lasting Memories

A study of women who participated in after-school STEM programs (like Techbridge Girls™) in grade school and high school shows that there is a life-lasting impact to these experiences.[™] The womens' strongest memories included field trips, unique "adventures" (such as launching rockets), and meeting new friends. We know how important STEM field trips and events are for girls, which is why we're sharing our time-tested tips with you in this guide.

As a role model, you have the potential to inspire interest in STEM careers, especially for girls and underrepresented groups. By sharing your experiences, you can dispel stereotypes that discourage girls from exploring science and engineering. Being a role model can also invigorate your professional life by developing your skills as a leader and faciliator, and serving as a reminder of what you love most about your career.

For youth managers organizing the trip for girls, think about:

- What goals do you have for the visit?
- What time commitment are you comfortable with?
- Will this field trip need to happen during the school day, after school, on the weekend, or during a holiday/vacation?
- Do you already have or need to make contact with a university or company?

For hosts coordinating the trip at the facility, think about:

- What's the best time of year, day of the week, and time of day for a field trip visit?
- Who can you invite to bolster your workplace team of hosts?
- How many girls do you have capacity for, and can you divide them into smaller groups for a better girl to adult ratio?
- How much time will you have with the girls?
- What hands-on activity will you offer? While a tour and a talk can be fun, those activities alone are usually not enough stimulation to make the lasting impact you want.
- How does the hands-on activity relate to your company or career?
- How will you give and get feedback about the event, from your girl audience, from your colleagues, from your co-planners, and from your employer?
- Is there a certain age-group or socio-economic community you want to work with?
- Would you prefer to partner with a community-based group or a school?



Field Trip Fundamentals

Anatomy of a Field Trip

Field trips should be interactive and incorporate hands-on activities or workshops, a tour of the facilities (like labs and research areas), as well as fun areas like the cafeteria or lounge. Strive to create a balance of hands-on activities and opportunities for students and role models to interact on a more personal level.

Introductions and Icebreakers: Introductions should be brief and friendly. Invite everyone, role models and girls, to engage in the icebreaker. This is your opportunity to set the tone that this will be fun and very different than a typical day at school.

Hands-On Activities: Activities should be related to your work. Choose a simple activity that will be interesting and engaging. For example, reverse engineering a product, creating chemical reactions, or designing simple coding projects are all great experiences for a field trip.

Tour/Scavenger Hunt: Framing the tour of the facilities as a scavenger hunt makes an ordinary experience fun and interactive. The scavenger hunt encourages interactions between employees and the girls and highlights areas and information about the company and employees. As you're designing the hunt, make sure to scan the entire space with a critical eye for safety hazards,

2

Set the tone.

The tone of the visit should be casual, relaxed and enthusiastic.

Make it personal.

Include students' names on badges or swag bags. This gesture goes a long way towards making girls feel welcome. off-limits spaces, and adult content. Walk the route again the morning of the event to make sure your intended plans have not changed.

Panels/speakers: Most young girls don't have the attention span for long presentations, nor do they want to

Find field trip resources, like questions to ask students, in our Role Model Online Toolkit.

see the formal sales pitch one might give adults. Short talks (no more than 10 minutes) are good for younger students. For high school age, panels or speakers can be appropriate as long as the participants tailor their talk to the age group and leave plenty of time for questions. For any age, aim for an engaging, dynamic speaker rather than one with an impressive title.

Lunch: The host company may provide lunch for all students; be sure it's something simple and quick to serve. Encourage role models to talk about their work or interests to help jumpstart conversations. Lunch might also be a good time to go over the scavenger hunt questions and answers, to spark casual chats.

Plan ahead.

Schedules often don't always go as planned, so have preparations completed ahead of time to allow for more time to interact.

4

Offer some "swag."

Any little tokens you can distribute, like pencils or notepads, provide an opening for parents to ask girls about their day. It can also be a powerful motivator to offer your business card, and encourage girls to contact you in the future.

Create an Experience

Field Trip Checklist

Planning a successful field trip requires coordination between the youth leader, who organizes and joins the girls on the trip, and the internal coordinator or host at the field trip site. Depending on what role you play, these checklists will help cover your bases.

For youth managers organizing the field trip:

GET IT STARTED (2-3 months beforehand):

- Establish a relationship with a host or coordinator at the company or facility field trip destination via email or phone call. Summer is an ideal time to do this before the school year.
- Find out when your field trip partner would like to host a visit.
- Look at school year calendar and identify dates that will work or are off limits for field trips due to holidays, testing, and other scheduled events.
- Find out if the company will match volunteer hours or sponsor the cost of the field trip.
- Determine the cell phone and photo-taking policy for the day. Often, both are prohibited due to corporate confidentiality (and for maintaining girls' attention throughout the day!)
- Ask if students need to be U.S. Citizens or Green Card Holders to visit the company facility. Does each student need to bring a form of identification?

PUT A PLAN IN PLACE (at least one month before):

- Establish a day and time for the field trip.
- Meet with the school or organization to discuss field trip rules and permission process. Make sure to ask if they have different rules for out-ofdistrict or county field trips.

- Ask for school or organization's list of approved bus companies.
- Put together a budget for transportation and any other costs.
- Work with your host to prepare an agenda that meets the goals for the field trip. Remember to think about hands-on activities, role model speakers, lunch or snacks, and other logistics.

HANDLE LOGISTICS (at least one month before):

- Complete all school or organization paperwork necessary for field trips.
- Hand out permission slips and media releases to be signed by girls' parents or adult caretaker.
- Consider if you need to arrange for a substitute teacher or volunteer for the day if there are youth not attending the field trip.
- Figure out how many volunteers you need to accompany the girls. Find out what the adult-girl ratio is required for the school or organization. Recruit parents or other adults for the trip.
- Reserve a bus for transportation. Buses may need to be on an approved list with appropriate insurance and paperwork on file. Check for companies that offer free buses for non-profits.

COORDINATE WITH YOUR HOST (two weeks to one month before):

- Help your host find internal role models willing to meet and talk to the girls. Do this by sending an invite to potential role models with a sample agenda and save the date.
- Schedule a preliminary meeting at the host company with their role models and volunteers about 1-3 weeks before field trip to go over agenda, goals, and tips about working with girls. Suggest this meeting as a brown bag lunch.
- If an in-person preliminary meeting is not possible, offer alternative like a conference call or webinar or share the training modules at www.tech-bridgegirls.org/rolemodelsmatter.
- Share any special needs or food allergies that girls in the group have with your host if they are providing food.
- Talk through a back-up plan with the field trip host in case they need to reschedule or cancel.
- Make sure to send media releases for role models at the company to sign.
- Ask the host for a list of the contact information for all the role models and speakers. Keep them in a volunteer database in case you want to reach out to them again.
- Ask role model/speakers to complete a short bio that you can share with girls the week before the trip. Show a Role Model Biography Card from this booklet and encourage them to make it friendly and personal, not like a corporate resume.

FINAL PREPARATION (1-2 weeks ahead):

- Confirm field trip schedule and logistics like sign-in and bus parking.
- Make sure you have all permission slips and media releases signed.
- Call the bus company to confirm arrangements (ask for driver's name and cell phone number), price, pick-up and drop-off times and locations.
- Remind girls and parents to be on time for the departure and pick up.
- Make sure you have the destination's map and directions. Print it out in case the bus company does not allow drivers to look at cell phones while driving.

"It's really nice to hear from women who have come from a background like mine and know that they can do this stuff and be good at it. It makes me feel encouraged to always try my best."

- Techbridge student

- Print out an agenda, including travel times for you and other volunteers.
- Create nametags for all participants.
- Pack the following: snacks and trash bags for bus (if needed), extra pencils/pens, materials and supplies for activities (if needed), camera and extra batteries (optional), media release form for volunteers, first aid kit.
- Prepare girls for the trip beforehand by talking about what the company does, the role models they will meet, and the type of questions they might want to ask when they're there.
- Seek possible sources of media coverage of the field trip (optional). Make sure to check with the host company to see if they have any rules and regulations about media coverage.
- Carry all students' contact information (including emergency numbers) with you while on the field trip. Make sure other adult chaperones know where this information is held. Techbridge recommends a red 3-ring binder as the designated place for copies of girls' forms with their emergency contact and health/insurance information.
- Communicate with your site partner the morning of the field trip, to notify them of the bus' departure from school/meeting spot. Confirm the final number of girls attending, and if you've encountered any traffic delays.
- Allow 20 extra minutes of drive time to the workplace, as buses move more slowly than cars, and parking may be tricky.

AFTER THE TRIP:

- Write a thank you letter or email to the field trip company.
- Have girls write thank you cards or sign a large group thank you card.
- Ask girls to complete an evaluation of the field trip. Offer to share results with the company host.
- Arrange for a follow-up call with the field trip host about the success of the trip and what you might change for the future.

For hosts at a field trip destination:

PUT A PLAN IN PLACE (and see checklist in back!):

- Work with the youth leader on the date, time, and what girls will be doing on the field trip.
- Talk through a backup plan in case you need to reschedule or cancel the visit.
- ☐ Find out if any girls have special needs. If you're providing food, find out about any allergies.
- Recruit volunteers at your company to be role models for girls. Find out if they want to talk to girls, moderate a panel, host an activity, or help with planning.

"I always want to say to girls, 'Don't ever give up on what it is that you're interested in. Don't let anybody tell you not to pursue your own dreams.' As a role model I think I really show these girls that if I can do it, you can do it, because you and I are just <u>the same."</u>

– Judy Wan, astrobiologist



Getting to Know You

Icebreakers are a great way to get your group engaged and to share information. Come up with a fun icebreaker game like the example below that everyone can take part in, including role models. When a role model learns more about the girls, it will help with her presentation.

Put Yourself on the Line

For this icebreaker, make an imaginary line down the room. One end is "strongly agree" and the other is "strongly disagree." Tell girls to move to a place on the line that feels closest to how they feel when you call out these prompts: My favorite ice cream is vanilla. I like pop music. Spring is my favorite season. I have a role model I look up to. I can think of four engineers. NOTE: Encourage girls to share the reasons for their responses.

- Reserve the meeting rooms you'll use and make cafeteria or snack arrangements now. Block this day on your corporate calendar and send save the date emails to your colleagues.
- Make sure your insurance covers liability for hosting minors visiting your worksite.
- Arrange for a photographer to take a group photo for your social media or internal newsletter.

COORDINATE WITH YOUTH LEADER:

- Set up a time to meet with the youth leader, role models, and other volunteers to review the field trip agenda.
- Ask role model speakers to complete a short bio for youth leader to share with girls before trip. Show the Role Model Biography Card from this booklet and encourage them to make it friendly and personal, not like a corporate resume.

FINAL PREPARATION:

- Remind your colleagues about the special guests invited to your facility.
- Give the security and reception desks details about the tour with arrival and departure times and names of adults supervising the trip.
- Confirm quantities, times, locations, and dietary restrictions with your cafeteria or catering.
- Make sure you know where the first aid kit is and have it well stocked.
- Send an email to the role models the day before with reminders about the group, the time, and what rooms you'll be meeting in. Make sure they have your contact information, like your cell phone or how to page you during the field trip.
- Consider labeling bathrooms and water fountains with "Welcome Girls!" signs to clue everyone in to the special guests on premises.





Tell Your Story

Role Model Speaking Tips

Speaking to a room full of young girls may seem daunting, but remember they are eager to get to know you. Many girls struggle with what their future will be, especially when it comes to a possible career in STEM. It will be meaningful for them to find out about the decisions you made in school and your career.

Begin by talking about yourself for about five minutes or less, especially if there are other adults in the room to introduce. If you are moderating a panel, think about ways to make it interactive. For example, ask the girls to chime in about what the panelists say or about a video they are watching.

To prepare for your session:

- Talk to the co-planner (youth leader) about behavior expectations and practices for the group. Find out if you will be working alone with the group or if someone will assist you.
- Learn about the girls you will be working with in advance. Ask the co-planners if they have techniques for getting the group's attention. Is there a group cheer that might be useful? See additional tips on Crowd Control at www.techbridgegirls.org/rolemodelsmatter/toolkit.

- Ask your co-planners to provide brief bios of the girls and information about the school or organization. What have the girls been studying that may tie to your work or workplace?
- Give girls the same opportunity to prepare by sharing your information in advance. Your co-planner may ask you to create your own bio card. Check out a sample bio card at the end of this section. You could also record a video or send an email introduction before the field trip.

Start by talking about you:

 What did you like to do when you were their age? Stick to general experiences, like sports you played or hobbies you had, and avoid timespecific trends or technology.

- Describe your academic career and path. Make sure to describe what things mean, like a B.S. degree or a position in a company.
- Talk about what attracted you to your field. Come up with a short story, like how you loved observing bugs and wildlife, which led you to explore more science and biology in school. Or perhaps your passion was building things so you wanted to find out how math and engineering could help.
- Explain how you chose your college major and how you got your first STEMrelated job.
- Describe more about your job: a day in your work life, an obstacle you had to overcome and how you did it, an exciting project you worked on.

While you are presenting:

- Get girls' attention before talking; don't start speaking until everyone is listening.
- Provide lots of opportunities for girls to participate by asking them questions or getting a show of hands if they agree with a point you've made.
- Establish eye contact with girls when asking and answering questions.
- Invite girls to rephrase your directions or questions to make sure they're understood.
- Move around the room to keep connected to the audience, especially restless girls.
- If you use a PowerPoint presentation to introduce yourself and your work, include lots of pictures and keep text and slides to a minimum (we suggest 3-5 slides).
- Bring in props or artifacts related to your work. Show-and-tell helps provide a better understanding of what you do, keeps everyone focused on what you are saying, and helps tell your story. A good general rule: the more visuals, the better.
- To quiet a group, send a silent signal such as raising your hand or giving a quiet reminder. Share this technique with your group before you get started so they understand the "call and response" and will respond appropriately.
- Use humor. Everyone is there to learn and have fun, too!

Encourage girls to ask questions:

• Share successes and challenges. Offer practical solutions for overcoming difficulties. These stories are relatable and interesting and may resonate with someone in your audience experiencing a similar situation. What have the girls been studying that may tie to your work or workplace?

- If there is something you're uncomfortable sharing, try to give a more general response. For example: "Well, I know that other people have...."
- Be honest and positive! The idea is to recruit girls to your field of work.

When you facilitate an activity:

- Be clear about the steps and instructions for the activity, make sure everyone is clear before starting.
- Make the girls aware of time limits, and remind them throughout the activity. For example, say: "You have 10 minutes before cleanup."
- Encourage girls to ask questions and use teamwork during an activity.
- Distribute materials after directions are given to keep girls from getting distracted beforehand.
- Offer a choice. If there are girls who are having a difficult time, provide an alternative activity for them if possible. There may be something these girls can do quietly and independently, such as journaling or creating a diagram of the activity.
- Consider putting out "fidgets" on the tables where girls will be sitting and working. Pipe cleaners and molding clay are fun and affordable.
- Throughout the activity, provide positive reinforcement that highlights effort. This will encourage girls to stay on task.
- Make sure girls know that the activity doesn't have to be perfect or even work. An important part of the engineering design process is facing an obstacle and coming up with solutions.

Role Model Bio(graphy) Card

The Role Model Bio Card is a fun way to tell girls about you. Make sure you highlight the reasons you chose your career, give one good piece of advice about achieving career or academic goals, and don't forget to include your interests outside of work. Insert a photo: a candid one of you at home, at work, or traveling is even better than a corporate headshot. See our Bio(graphy) card template in the resources tab of

www.techbridgegirls.org/rolemodelsmatter.

Process Engineer



Bachelor's Degree in

Works for Shell Oil

"Set an end goal and create a

path to get there. Anyone can

a plan."

achieve their dreams if they make

Chemical Engineering

Process Engineers are a type of Chemical Engineers, and are in particularly high demand at oil and gas companies. They may supervise the control room of a drilling or extraction area, or design solutions to problems that come up in the production factory. Process Engineers think about how to keep people and natural resources safe and moving efficiently. The average annual salary is \$116,900 or about \$56 ber hour.

Jabreel's Biography

My parents were my biggest role models. They required and encouraged me to always do my best in everything that I do. They believed I could achieve anything I set my mind to.

In middle school, I wanted to be an ice cream taster. In high school my chemistry teacher encouraged me to use my abilities in math and science by becoming an engineer. I also have a cousin who is a chemical engineer.

In college, I really enjoyed belonging to the National Society of Black Engineers and the Society of Women Engineers to hang out with other students like me. In my free time, I hang with my dog, watch musicals, read, craft, volunteer and write a blog. How to do it

I thought I wanted to go to a certain big university until I went to a summer program at a smaller school. At first, I didn't want to spend my entire summer there, but then I had such an amazing time at that school, so I stayed there to earn my degree!

My typical day at work is checking perfor mance results from the last day, looking for opportunities to improve or trouble shoot. I attend a daily alignment meeting to discuss work plans for everyone in our unit, trying to optimize or make everything better.

Technobabble

Technical information or work jargon can be tough on any audience so here are some ways to deal with it:

- Describe your job in simple and girl-friendly language. Find out what they already know and what they might be learning in school.
- Use visuals, metaphors, or analogies to describe a concept, word, or practice. For example, compare measurements to something relatable (the size of a cookie or smaller than an ant). Or find an interactive way to explain your concept, such as acting it out.
- Write or draw your concept or word on a poster board so girls can see a visual.
- When doing an activity, highlight any new words you'll be using by writing them on a board and encouraging girls to repeat them. (Limit new vocabulary to 3-5 to keep it manageable.) Use pictures or objects to illustrate what you mean, if need be.

Change the Conversation

Changing the Conversation (engineeringmessages.org) emphasizes ways to deliver messages about your field in relatable ways that will resonate.^v

- Girls want to make a difference in the world. Let them know that scientists and engineers are always working to improve the human condition.
- Explain that scientists and engineers are creative problem-solvers who help shape the future.
- Highlight discoveries and inventions by women and minorities.
- Share the idea that a background or degree in STEM is applicable to many different careers.

Hands-on Activities!

Hands-on activities can provide an example of how you work and show how creative and interactive science and technology can be. Find activities that are fun, showcase your career, have real world applications, and highlight concepts in science and engineering. Talk to your co-planner about the type of activity that best suits you, your work, and the girls. She may be able to provide ideas and resources.

As you plan and prepare your hands-on activity, keep this in mind:

- Consider the age group you will be working with and choose or design an activity that is age appropriate.
- Make your activity relevant to topics girls are learning at school and describe how it connects to your job or studies.
- Don't get too complex. Factor in time and location constraints, the skill level and size of the group, and the cost of materials.
- Practice the activity! This will help you anticipate any issues with the materials and where girls might have difficulty so you can develop strategies to help them. Be prepared for what you will do if the activity doesn't work. What can the girls learn from this experience?
- Practice the activity! This one is so important it deserves to be read again.

Remember, an activity that doesn't go quite as planned provides the opportunity to teach girls about the process of discovery, perseverance, and learning from mistakes. Be prepared to share an example from your own work or studies where you didn't get the results you expected. Emphasize the regularity of setbacks and re-design in the work of scientists and engineers.

TAKE A DEEPER DIVE

These next pages offer strategies for facilitating hands-on STEM activities:

- » Connect to the Engineering Design Process
- » Connect to Careers
- » Inspire Curiosity
- » Ask Questions
- » Get Feedback
- » Stay On Track



The Engineering Design Process (EDP) is an effective tool to share with girls about the way you methodically solve a problem or consider a challenge in your work, and come up with solutions.

To make a resonating connection between your work with girls' lives, liken the EDP to the way they might choose a recipe or write an essay for school.

We begin by identifying the problem at hand, brainstorm possible solutions, choose the preferred possibility, design the way we will get to the chosen solution, test to see if it yields our desired result, show it to others and reflect ourselves to get feedback: did we get the desired result? Are there further improvements or ways to simplify? Redesign with the feedback in mind, and begin the cycle of design again.

When girls understand that this method is something they're intrinsically good at, they feel they embody the skills of an engineer or scientist.

Connect to the Engineering Design Process

Use the steps in the Engineering Design Process when creating your hands-on activity. Print out a copy for each girl or display this on a poster board for the girls to see.



Connect to Careers

It can be challenging for young people to find meaningful connections between an activity and a career or a real-life situation. As you work through an activity, show how it relates to your work or a real world problem.

Sometimes you may facilitate an activity that doesn't directly relate to your field. That's alright. You can always talk about how the engineering design process and the scientific method are processes you use to solve a problem at work, just like the way girls are working through the hands-on activity. You can also point out that how, just like you, they have shared responsibilities and roles to play on a working team.

1

If your job is abstract and difficult to explain, talk about how your role supports the company's services or products, and how the activity at hand relates to your industry.

2

Talk about how your work helps others, even if it's simply supporting your colleagues. Studies show girls are particularly motivated by finding out how a person's career can make the world a better place.

3

Teamwork, collaboration and communication are essential to your work. When working with the girls, point out these skills as they work on their projects.



NOTE

When explaining real-life applications of an activity, keep in mind that girls may relate more to connections in their home, school, or communities rather than to national events or global issues. Try to keep connections as local as possible first, then expand to global ramifications.

Inspire Curiosity

Scientific inquiry is the way in which scientists interact with the environment, ask questions, and seek ways to answer those questions.

The following tips will help you encourage inquiry practices and strengthen girls' natural curiosity:

- Encourage girls to make predictions and ask questions.
- Invite them to record and discuss their observations and data. Notetaking and charting results are important scientific skills to hone.
- Help them evaluate recorded evidence to formulate a new idea.

- Challenge girls to apply what they have discovered to other situations.
- Use probing questions throughout the activity to get at how or why they did things.
- Provide ample time to explore and tinker, and redesign.

When girls engage in inquiry through hands-on activities and conversations with role models, they learn critical thinking skills. These skills take time to develop and can be difficult to define and teach. Instead, show them how problem-solving works by narrating your own thoughts as you try something new or challenging. You might feel silly at first, but letting everyone hear what you're thinking brings a complex thought process to life. Modeling your thought process demonstrates that there are many ways to think through a challenge.

Through modeling, you also show girls how to keep a positive attitude about failure and setbacks. Setbacks are opportunities for learning. Emphasize that in real life, ideas frequently fail; scientists and engineers take their lessons learned and go back to the drawing board.

WHAT WERE YOU THINKING?

Model problem-solving. Choose a task or problem and practice thinking aloud how you would solve it. Start with an everyday task such as packing your lunch. Talk through the factors you consider and your decision-making process, as well as how you evaluate your results and redesign.



Ask Questions

Questions are an important component of inquiry practice. A few simple strategies can help stimulate asking questions that fit the age and comprehension-level of your group. By encouraging questions, you not only help girls understand the concepts at hand, but underscore that their ideas are important.

- Ask open-ended questions such as, "Tell me how you came up with this idea?" and "Why did you choose to incorporate that design element?" You will encourage girls to use evidence to explain their work.
- Use questions to challenge girls to think about their process and actions, such as "What did you expect then?" or "And then what did you do?" Questions can guide them to feel more comfortable trying out ideas.
- Give girls pause to think about their response or answer. Providing a little wait time to answer questions will help increase responses and girl-initiated questions.
- Be sure to use higher-level questions throughout your interactions. Higherlevel questions are those that ask girls to analyze, synthesize, or apply information, such as "What changes would you recommend to improve your design?"

These types of questions encourage girls to be critical thinkers:

- What would happen if ...?
- What do you see as other possible outcomes?
- What are the applications for this? Who would this help?
- Why did you choose ... (these materials, this design, etc.)?

"What I really love about outreach is that it reminds me why I decided to be an engineer. It's easy to get caught up in the difficulties of exams and work, but outreach activities really capture the fun of science and engineering. It's always great to see girls get just as excited about science and engineering as I am."

- Supriya Hobbs, Process Engineer



Get Feedback

Q HERE ARE A FEW FEEDBACK SENTENCE STARTERS:

I really like how you...

This is really interesting because...

I saw you were using a lot of effort when...

The strengths of your design are...

How Are We Doing?

Feedback is an essential part of the learning process. Constructive feedback is an important method to motivate girls, instill confidence, and help them overcome challenges.

Constructive feedback provides guidance and supports the learning experience. One way to do this is by posing questions that help girls break down the steps and actions of their work, analyze what has occurred, and describe the process they followed. The questions and feedback should challenge and encourage girls to take risks.

Constructive feedback also emphasizes the value of effort and persistence. For example, praising girls by telling them that they are "really smart" does not show them that it was their effort and persistence that helped them succeed. Pair compliments with evidence from their work.

Here are tips for providing feedback:

- Be positive and specific. For example, "You are doing a great job thinking through the steps and care you should take as you set up your experiment."
- Don't wait until your closing discussion to review the girls' work. Provide feedback throughout the activity.
- People react differently to feedback. Keep in mind some girls will welcome questions and conversation about their projects, and others will want extended time to work without interruption. Some use competition as a motivator, and others will shut down if you compare their work to others. Read body language and tread carefully. You can also ask your co-planner for specific advice about who likes to be treated how.
- Younger girls may misunderstand verbal feedback. Demonstrate what you are talking about.
 For example, showing a group the strength of a triangle in a design may be easier for them to understand than just telling them.

Encourage girls to provide constructive feedback to their peers as they work together. Providing feedback develops their critical thinking skills and is an important part of the inquiry process. As you ask girls to give each other feedback, make sure that they understand how to do so in a positive and constructive way. Guide them to ask each other about their work and the decisions they made. Feedback should not just be about liking or disliking a project or final result, but helping others to analyze and address challenges.

Stay on Track

Hands-on activities are engaging, but if girls get confused, bored or frustrated, they can get off track. When leading a hands-on activity, observe how girls are interacting, circulate around the room, and respond to what you see and hear.

- Are there girls who are not participating or who are taking over the conversation or activity? Often, pairing girls and giving specific roles and tasks for the activity can alleviate these dynamics and encourage collaboration.
- Do some girls appear lost or disengaged? Talk to them and find out why. Use questions or demonstrations to guide them back on track. Resist the urge to complete the activity for them. If they are truly stuck or have completed the activity early, modify or extend the activity as needed, such as changing the materials, the level of challenge, or the questions or constraints to consider.
- Does one girl work faster and finish earlier than the others? Giving her a role as a helper may keep her engaged. She can circulate and report back or support others who are not as far along.
- Be sure to plan enough time so girls can complete the activity and have time to redesign their project.
- Beware of over-scheduling. It is important to have enough to keep everyone busy, but as a part of your planning process determine what elements of your agenda you can cut if you are running late.

If you have a girl struggling with an activity, what kind of feedback could you offer to help her complete the challenge?



HOW? WHY?

What are examples of open-ended questions you can use during the hands-on activity?

This is a good opportunity to look closely at your lesson plan or activity instructions and jot down questions to ask at opportune moments.

Reflection

Girls often do hands-on activities at STEM events and field trips, but they may see them as fun projects or crafts rather than projects similar to those scientists and engineers take on in their work. Reflection is a critical part of the learning process, so girls can connect what they did to real work. You will want to leave time to reflect on the hands-on activity, as well as what girls thought and felt in the workplace. Reflection helps girls gain a greater understanding of their experience, become more aware of the knowledge and skills they developed, identify their strengths and areas for improvement, and come up with a plan for continued exploration.

Group discussions are a common form of reflection and provide an opportunity for girls to expand their understanding. When girls understand the real-world applications, activities are both meaningful and memorable. During these conversations, girls can apply and interpret their experience to develop a deeper understanding of science or technical concepts.

Tips for conducting a group discussion:

- Establish guidelines so that everyone can participate—this is key to a successful discussion. Pass around a "speaker object" so everyone has an opportunity to participate, as well as the option to pass, or to come back to them later.
- Keep track of time. When schedules run late, you lose time for discussion and reflection. Consider setting a time limit and designating a time keeper, so more people have a chance to share.
- Provide restatements as needed. Restating what a girl says clarifies her point for the group. This strategy is particularly helpful when a girl is struggling with a question or concept.
- Ask open-ended questions—those that do not require one right answer. Invite girls to build on others' responses.
- Be aware of your body language. Making eye contact and smiling can help create an inviting and open atmosphere for discussion.

"There is nothing more rewarding than witnessing that 'light bulb' moment, when a child understands a difficult concept, gets excited about science and engineering, and realizes that she or he is capable of something great! These moments make me strive to be a better engineer and motivate me to continue to inspire others."

- Sophie Leons, PhD Student, Life Science

RECOMMENDED READING FOR ROLE MODELS

To learn more about how to effectively communicate STEM careers to girls, and improve understanding of STEM careers, check out the following resources:

Changing the Conversation (engineeringmessages.org)

Why So Few? Women in Science, Technology, Engineering, and Mathematics (aauw.org/learn/ research/upload/whysofew_execsummary.pdf)

SWE Learning (societyofwomenengineers.swe.org/index.php/learning)

SciGirls Seven: How to Engage Girls in STEM (http://scigirlsconnect.org/page/scigirls-seven)

SciGirls Role Model Tips (http://scigirlsconnect.org/page/role-models)

Generation STEM report by the Girl Scout Research Institute (http://www.girlscouts.org/ content/dam/girlscouts-gsusa/forms-and-documents/about-girl-scouts/research/generation_ stem_full_report.pdf)





Remember...

Don't sweat the small stuff. Mistakes will happen. Use these as opportunities and teachable moments. Becoming a role model is an opportunity to engage with girls and open up a world of possibilities for them. Use your co-workers as resources and plan and prepare as much as possible, but know that if something goes wrong, you have the poise and know-how to keep moving forward. Girls will focus on and remember all the many things that went well if you focus on them, too.

Evaluation

It's good practice to assess your involvement as a role model. Engaging in discussion with the coorganizers about the event will provide insights to improve, help you understand your impact, and reflect on your own practices. Find out if the youth program has an established process for evaluation. If not, talk with the event organizer to get feedback about your presentation, activity, and group.

Evaluation and feedback is a two-way street. Follow up with the co-planner to give feedback about the field trip. Your feedback might include event logistics, preparation for you and the girls, or communications. Your feedback will help the organizers create better experiences for their girls and role models in the future.

A Techbridge Girls Field Trip in Action

Experience a day in the life of a Techbridge Girls Visit to Chevron's Headquarters

See what a field trip looks like, consider the details of the day's plan, and imagine planning your own.

Case Study: Chevron

At Chevron, energy is at the heart of everything they do. Their success is driven by their people and commitment to get results the right way – by operating responsibly, executing with excellence, applying innovative technologies and capturing new opportunities for profitable growth. In their social investments, supporting STEM education is one of their key priorities.

Techbridge Girls Arrive at Chevron

The Chevron headquarters sits on a 32-acre site in San Ramon, CA, complete with labs where girls can meet engineers and scientists at work.

For this field trip, a Techbridge youth manager planned out every detail with a Chevron Social Investment Advisor for this successful day. See how it played out:

A bus carrying 30 girls arrives at Chevron, a sprawling complex that is home to twelve buildings surrounding a huge pond and towering fountain. For many of the girls, this is their first experience on a corporate campus. But from the moment they arrive at the main building where a friendly security guard greets them and distributes badges with each girl's name, they feel welcome. Techbridge rounds up the girls to do a quick review of the rules and expectations.





A Warm Welcome

The Chevron Social Investment Advisor, Anita, and several other Chevron employee role models usher the girls into a conference room or classroom space for the day. She tells the girls how safety is a big part of Chevron's culture: they have a commitment to make sure all their employees and guests are always safe in the workplace. She also tells girls to use the handrails while climbing stairs and explains what to do in case of an emergency evacuation for a fire or earthquake. The Techbridge youth manager stands behind to make sure there are no stragglers.

Anita leads the group with introductions and an icebreaker game of Role Model Bingo, a fun and active way for girls to get to know their host and the role models. One of the questions in the game is about a safety measure the girls learned earlier. (For more information about this game and other icebreakers, see http:// www.techbridgegirls.org/rolemodelsmatter/category/icebreakers/.)



Let the Activities Begin!

Trish, a chemical engineer at Chevron, begins with a Power Point presentation to share some personal information about herself, like her hobbies and interests. She asks the group what they already know about alternative sources of energy. Trish gets the girls brainstorming about the various forms of energy they've already used that morning to connect to what they will learn about biofuels research.

Trish engages girls in a hands-on activity—an experiment to evaluate how much and how to obtain a fuel source from plants. The group tests which variable a banana, wheat germ or sawdust—will produce the greatest carbon dioxide fermentation when mixed with warm water and yeast. After the experiment, Trish explains how ethanol is made in a similar way. One girl tells Trish, "This is what you get to do for work? Being a scientist is fun!"

(24







Lunch Break

After an informational and fun-packed morning, girls take a lunch break in the company's cafeteria. A Chevron role model sits at each table, prepared to answer questions and engage in conversation related to their work. This is one of many opportunities to ask the girls about their interests and aspirations. Before the trip, some girls felt shy or timid about this chat time, so the organizer set up table tents with conversation starters for each group. (See sample questions at www.techbridgegirls.org/rolemodelsmatter/ resources)

The Grand Chevron Tour

The girls regroup to tour designated areas of the facility. They visit the Chevron gym, check out vintage gas pumps and a model of a Chevron car, and step into a data center with an impressive bank of computers. A Techbridge Girl tells her friend, "This trip has helped me decide what I want to be when I grow up. I want to be a scientist."

Chevron Fun Facts, Reflection, and Farewell

The role models and girls gather together one more time to play a Chevron Fun Fact game challenging girls to recall what they learned that day. Girls then share about what they liked best about the day. One girl says she liked working on the biofuels experiment because it's as if she and the other girls worked at Chevron too. Another Techbridge Girl said, "All of them [the role models] went through college and they have a career. It makes me want to go to college even more." The students close with heartfelt thanks to the hosts and take a group photo to remember this remarkable trip.

"We related to each other as females with the same challenges, especially in middle and high school where you want to 'belong'. I think my stories resonated with young girls trying to figure out how they can express their curiosity about science or math or other topics without sacrificing their social lives, and how that's sometimes hard to manage these days."



Field Trip Plan

Sample Schedule & Checklist

Time	Activity	Description	Lead	Materials Needed
10:15 - 10:25	Girls Arrive and Sign In	Techbridge arranges for the buses and permission slips. Girls and role models sign-in, and all participants make/wear nametags.		
10:25 - 10:30	Welcome and Icebreaker	Host welcomes girls and quickly introduces role models. Techbridge Program Coordinator leads an icebreaker activity to get everyone comfortable and check for girls' baseline knowledge.		
10:30 - 10:50	Interview and Introduce a Role Model	Techbridge girls split into groups of 2-3 and "interview" a role model, an opportunity for shyer girls (and role models!) to interact. Girls introduce their role model to the group. Techbridge brings interview questions.		
10:50 - 12:00	Hands-on STEM Activity	Girls and role models work on a hands-on STEM activity of the host's choice. Techbridge can provide ideas and materials. Some hosts provide materials, or access to technology, for example, if they really prefer doing a computer science activity.		
12:00 - 12:45	Lunch with Role Models			
12:45 - 1:00	Group photo, bathroom break			
1:00 - 1:45	Tour and Scavenger Hunt	Opportunity for girls to see a STEM workplace. Role models are welcome to participate but are not required for the afternoon.		
1:45 - 2:00	Reflection Circle and Shout-Outs	Opportunity for girls to reflect, which reinforces content understanding and retention.		
2:00 - 2:15	Goodbye and Departure			

General Info

Company			
Date of Trip			
Location of Trip			
School	Name:	City:	Grades:
Youth Group Lead	Name:	Cell:	Email:
Company Lead	Name:	Cell:	Email:
Cost Coverage			

Training Date	
Plan for Recruiting Role Models	
Location of Training	

Debrief

Meeting Date	
Participants	
Student Quotes	
What Worked?	
Partner Feedback	
When to Schedule Next Visit?	
Who should be invited to participate next time?	
What should we improve in train- ing/preparation?	
What should we improve in the girls' experience?	

Planning Checklist

Bus

cheduled	
Company:	
hone:	
unch	
Ordered	
lanci	

Sent Partner Communications

Sample Agenda			
RM Recruitment Sample Language			
Media Release/Waiver for each adult			
Final Plan Sheet			
Thanks Email			
Thanks Cards			
Girl Survey Results			

Media

Media Alert to Local Press and Company Newsletter · ·	
Social Media posts throughout day	
Article/Blog with photos afterward	

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www.techbridgegirls.org