Seven Strategies to Engage Girls (and All Kids) in STEM

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What does a girl (or any student) imagine when she thinks of a scientist?
**BIG IDEA:**
To change how millions of girls (ages 8-13) think about STEM

- Features *real* girls doing investigations they’re passionate about
- Highlights the *process* of science
1. Girls benefit from collaboration, especially when they can participate and communicate fairly. (Parker & Rennie, 2002; Fancsali, 2002)
2. Girls are motivated by projects they find personally relevant and meaningful. (Eisenhart & Finkel, 1998; Thompson & Windschitl, 2005; Liston, Peterson, & Ragan, 2008)
3. Girls enjoy hands-on, open-ended projects and investigations. (Chatman, Nielsen, Strauss, & Tanner, 2008; Burkam, Lee, & Smerdon, 1997; Fanscali, 2002)
4. Girls are motivated when they can approach projects in their own way, applying their creativity, unique talents and preferred learning styles. (Eisenhart & Finkel, 1998; Calabrese Barton, Tan, & Rivet, 2008)
5. Girls’ confidence and performance improves in response to specific, positive feedback on things they can control – such as effort, strategies and behaviors.

6. Girls gain confidence and trust in their own reasoning when encouraged to think critically. (Chatman, et al., 2008; Eisenhart & Finkel, 1998)
7. Girls benefit from relationships with role models and mentors. (Liston, et al., 2008; Evans, Whigham, & Wang, 1995)
Role Models Matter: Engaging Girls (and All Kids) in STEM

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Why Train Role Models?
CHANGING THE CONVERSATION: Messages for Improving Public Understanding of Engineering

National Academy Of Engineering (NAE)
http://www.nap.edu/catalog.php?record_id=12187
WHY SO FEW?
Women in Science, Technology, Engineering and Mathematics

SOLVING THE EQUATION
The Variables for Women’s Success in Engineering & Computing

American Association of University Women
http://www.aauw.org
Adjust the STEM Image

• ‘Nerdy, geeky and boring’
• Provide STEM role models that look and sound like them
• Use words to describe STEM like discovery, design, imagination, innovation, contribution
• Use the word create, not build
Adjust the STEM Image

Use images of people:
Younger girls pick images involving female engineers; boys more likely to pick images that features “things”
Stop Focusing on STEM Inputs

Stop focusing on math and science as the needed inputs for a STEM career and instead focus on:

– Outputs
– Career opportunities
– Making a difference in the world
“Secret Sauce” for Success

1 part passionate
1 part personal
1 part informal
1 part interactive

Mix ingredients and give time to develop
Techbridge Role Model Event

- Icebreaker (10 minutes)
- Role model introductions (10 minutes)
- Hands-on STEM activity
- Reflection and connections to the world (10+ minutes)
Icebreakers can...

- Make students and role models more comfortable
- Introduce new scientific topics, vocabulary or careers
- Check for background knowledge
Key Elements of a Role Model Interaction (and Interaction)

- Make it personal
- Use kid-friendly language
- Share academic and/or career path
- Share challenges and triumphs
- Show how engineers can change the world

These elements should be threaded throughout a role model interaction!
Hands-on Activity
Hands-on Activity Facilitation

- Give useful and specific feedback
- Use questions
- Promote inquiry
- Highlight the challenge
- Praise the effort
- Foster collaboration
Reinforce the Growth Mindset

- Teach children that intellectual skills can be acquired.
- Praise the effort.
- Highlight the struggle.
- Gifted programs should send the message that they value growth and learning.

### Comparison Table

<table>
<thead>
<tr>
<th>Fixed Mindset</th>
<th>Growth Mindset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence is static.</td>
<td>Intelligence can be developed.</td>
</tr>
<tr>
<td>Leads to a desire to <em>look smart</em> and therefore a tendency to</td>
<td>Leads to a desire to <em>learn</em> and therefore a tendency to</td>
</tr>
<tr>
<td>• avoid challenges</td>
<td>• embrace challenges</td>
</tr>
<tr>
<td>• give up easily due to obstacles</td>
<td>• persist despite obstacles</td>
</tr>
<tr>
<td>• see effort as fruitless</td>
<td>• see effort as path to mastery</td>
</tr>
<tr>
<td>• ignore useful feedback</td>
<td>• learn from criticism</td>
</tr>
<tr>
<td>• be threatened by others’ success</td>
<td>• be inspired by others’ success</td>
</tr>
</tbody>
</table>

AAUW Why So Few
ENGINEERING DESIGN PROCESS

IDENTIFY THE PROBLEM

RESEARCH & BRAINSTORM

BUILD

TEST

IMPROVE

PRESENT SOLUTIONS

works

doesn’t work

http://smartspaceniu.com
Reflection - Make it Meaningful

Connect the activity to...
• Kids' lives
• Careers
• STEM
• Other activities or disciplines

Make connections throughout the hands-on activity.
Find STEM in your everyday life ... & use resources to help you!

- Sports
- Cooking
- Driving
- Games & Apps
- Music
- Health & Medicine

- PBS
- MythBusters
- STEM & Puzzle Apps
- STEM Camps
- Museums & Centers
- Local STEM Events
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Resources
Collaborative Effort including Lawrence Hall of Science, Exploratorium, New York Hall of Science, Science Museum of Minnesota, Children’s Museum of Houston
Searched:
• Civil Engineering
• Free - $1.00
• 10 – 30 minutes
Finding & Being Role Models

http://www.nepris.com/
Finding & Being Role Models

THE CONNECTORY
http://www.theconnectory.org

Million Women Mentors
Advancing Women and Girls in STEM Careers Through Mentoring
www.millionwomenmentors.org

FabFems
http://www.fabfems.org/
Techbridge Resources

• Role Model Guide
• Techbridge Tips
• Online Training

www.techbridgegirls.org
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