

# Launching a STEM Program in your Elementary School

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# Top Myths about Girls in Math and Science

- > Boys perform better in math
  - boys and girls score equally on standardized math tests (2008)
- > From the time they are in school, most girls are less interested in science than boys are.
  - equal interest Elementary School
- > When girls are not interested in science, teachers & parents can't do much to motivate them.
  - teacher & parent support is crucial in girl's interest in STEM



# The Facts

- > Women constitute 47% of the workforce in the US (2010)
- > Women make-up just
  - 25% of the STEM workforce
  - 11% of engineering
  - 25% of technology-related occupations.
- > Men outnumber women (73% vs. 27% overall in all sectors of employment for science and engineering.
- > Fastest growing fields in the workplace tie directly to STEM



# STEM Careers

actively recruiting females

## Behavioral & Social Science

- Marriage & Family Therapist
- Medical Social Worker
- Political Scientist
- Psychologist
- Sociologist

## Earth & Environmental Science

- Aquacultural Manager
- Aquarist
- Cartographers & Photogrammetrist
- Climate Change Analyst
- Diver
- Emergency Management Specialist
- Environmental Compliance Inspector
- Environmental Scientist
- Geographer
- Geoscientist

## Hydrologist

- Industrial Health & Safety Engineer
- Meteorologist
- Park Ranger
- Soil and Water Conservationist
- Soil Scientist
- Surveyor
- Water & Liquid Waste Treatment Plant & System Operator

## Engineering

- Aerospace Engineer
- Aerospace Engineering & Operations Technician
- Architect
- Automobile Engineer
- Biochemical Engineer in Demand
- Bioinformatics (Technology & Product Development) Manager
- CAD Technician

## Chemical Engineer

- Civil Engineering Technician
- Child Engineers
- Commercial & Industrial Designer
- Electrical & Electronics Engineer
- Electrical Engineering Technician
- Energy Engineer
- Environmental Engineer
- Environmental Engineering Technician
- Fuel Cell Engineer
- Geographic Information Systems Technician
- Hydroelectric Plant Technician
- Industrial Engineer
- Infrastructure Architect
- Mapping Technician
- Marine Architect
- Materials Scientist and Engineer
- Mechanical Engineer

## continued...

- |  |   |  |
|--|---|--|
| Mechanical Engineering Technician        | Wind Energy Engineer                          | Remote Sensing Scientist or Technologist     |
| Methane Gas Generation System Technician | Wind Turbine Service Technician               | Software Quality Assurance Engineer & Tester |
| Microsystems Engineer                    | <b>Interdisciplinary</b>                      | Statistician                                 |
| Nanotechnology Engineer                  | Patent Lawyer                                 | Life Scientist                               |
| Nuclear Engineer                         | Science Writer                                | Agricultural Inspector                       |
| Petroleum Engineer                       | Technical Writer                              | Agricultural Technician                      |
| Photonics Engineer                       | <b>Math &amp; Computer Science</b>            | Animal Breeder                               |
| Photonics Technician                     | Actuary                                       | Animal Trainer                               |
| Robotics Engineer                        | Computer Hardware Engineer                    | Anthropologist                               |
| Robotics Technician                      | Computer Programmer                           | Athletic Trainer                             |
| Semiconductor Processor                  | Computer Software Engineer                    | Audiologist                                  |
| Solar Energy Systems Engineer            | Database Administrator                        | Biochemist                                   |
| Solar Photovoltaic Installer             | Economist                                     | Biomedical Scientist                         |
| Sustainability Specialist                | Math Teacher                                  | Biological Technician                        |
| Transportation Engineer                  | Mathematician                                 | Biologist                                    |
| Transportation Planner                   | Multimedia Artist or Animator                 | Biology Teacher                              |
| Water or Wastewater Engineer             | Network Systems & Data Communications Analyst | Biomedical Engineer                          |
| Weatherization Installer or Technician   |   |  |

## continued...

- |   |   |   |
|---|---|---|
| Chemical Technician                       | Chemical Technician                       | Chemical Technician                       |
| Chemist                                   | Chemist                                   | Chemist                                   |
| Chemistry Teacher                         | Chemistry Teacher                         | Chemistry Teacher                         |
| Electrician                               | Electrician                               | Electrician                               |
| Film and Video Editor                     | Film and Video Editor                     | Film and Video Editor                     |
| Food Science Technician                   | Food Science Technician                   | Food Science Technician                   |
| Food Scientist or Technologist            | Food Scientist or Technologist            | Food Scientist or Technologist            |
| Forensic Science Technician               | Forensic Science Technician               | Forensic Science Technician               |
| Nuclear Monitoring Technician             | Nuclear Monitoring Technician             | Nuclear Monitoring Technician             |
| Nuclear Power Reactor Operator            | Nuclear Power Reactor Operator            | Nuclear Power Reactor Operator            |
| Occupational Health & Safety Specialist   | Occupational Health & Safety Specialist   | Occupational Health & Safety Specialist   |
| Physicist                                 | Physicist                                 | Physicist                                 |
| Physics Teacher                           | Physics Teacher                           | Physics Teacher                           |
| Pilot                                     | Pilot                                     | Pilot                                     |
| Power Distributor & Dispatcher            | Power Distributor & Dispatcher            | Power Distributor & Dispatcher            |
| Power Plant Operator                      | Power Plant Operator                      | Power Plant Operator                      |
| Precision Instrument & Equipment Repairer | Precision Instrument & Equipment Repairer | Precision Instrument & Equipment Repairer |
| Sound Engineering Technician              | Sound Engineering Technician              | Sound Engineering Technician              |

## The Research

from the Center of Research on Girls at Laurel School

- > Connect STEM to Meaningful Objectives
- > Use Collaboration to Engage Girls in STEM
- > Teach Girls to Adopt a Growth Mindset
- > Shielding Girls from Stereotype Threat
- > Provide Opportunities for Girls to Tinker
- > Expose Girls to Women Role Models in STEM Fields



## Why Elementary School?

- > Difficult to learn spatial concepts past 5th grade
- > Capture interest early
- > Build confidence



## PreK – 4<sup>th</sup> STEM Activities

Now:

- > STEM Carts (PreK – 4th)
- > 3rd/4th – Pumpkin STEM Activity
- > 3<sup>rd</sup>/4<sup>th</sup> – STEM Career Day
- > 4th – STEM Day
- > Electronic Dissection
- > Tinkering Stations created by High School Girls
- > Online Resources/Games



Future:

- > Software & Apps
- > Tinkering Activities during National Engineers Week (Feb 17 – 23, 2013)
- > STEM Night

## STEM Carts (Building Toys)

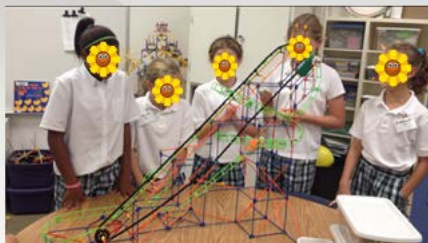
- > Purchased from: Amazon, Walmart, Target, Mindware, Fat Brain Toys

- > Items: Pattern Blocks, Legos, Lincoln Logs, Wooden Blocks, Kid K'Nex, Trio Sets, Keva Blocks, Marble Runs, Gears, Katie Cubes, Tangrams, Wedgits, Magnatiles, Zoobs, Straws & Connectors, Wedgits, dominoes, etc...



## Ideas?

- > STEM Carts (building toys) – Mindware & Fat Brain Toys
- > STEM Day – PBS Design Squad
- > Tinkering Stations: Children's Museum (Ft. Worth)



Roller Coaster Video - Deleted

## Tips

- > Figure out what works for your school
- > Budget? (grants, PTA, fundraiser, wish list)
- > Implement one activity per year



## Online STEM Activities

- > Try Engineering: <http://www.trvengineering.org/play.php>
- > Tinker Ball: [http://www.inventionabplay.org/playhouse\\_tinker.html](http://www.inventionabplay.org/playhouse_tinker.html)
- > Building a Rollercoaster: <http://pbskids.org/flash/games/coaster/game.html>
- > Bridge Builder: [http://www.learn4good.com/games/simulation/build\\_bridge\\_across\\_canyon2.htm](http://www.learn4good.com/games/simulation/build_bridge_across_canyon2.htm)
- > Interactive Simulations (PhET): <http://phet.colorado.edu/en/simulations/category/by-level/elementary-school>
- > Zoom Sci: <http://pbskids.org/zoom/activities/sci/#engineering>
- > PBS Link to Several STEM Websites: <http://www.pbs.org/teachers/files/pdf/STEM%20Resources%20from%20PBS-portrait.pdf>

## Apps

- |                   |                    |                 |
|-------------------|--------------------|-----------------|
| > Simple Physics  | > Blocks           | > Move Me       |
| > Blueprint 3D    | > Unblock Me       | > Move the Box  |
| > Minecraft       | > Jigsaw Puzzles!  | > LetsTans      |
| > Slideshow       | > World Map Puzzle | > Tetra 3D      |
| > Rush Hour       | > Sudoku School    | > CrossFingers  |
| > Mazes HD        | > TanZen           | > Trapped       |
| > Doodle Fit-Full | > Flow Free        | > Sliding Tiles |
| > Drop 4          | > The Magic Egg    | > Mayan Puzzle  |
| > Sliding         | > Animator         | > Tangrams      |
| > Parking Lot     | > Blokus           |                 |
| > Mega City       | > Move It!         |                 |

## How can parents help?

- > Encourage Exploration through Play
- > Find your child's "STEM sweet spot"
  - building projects (block play)
  - exposure to nature (get outside)
- > Keep STEM in mind during family activities
  - choose movies with science themes
  - choose board games that involve logic (chess)
  - look for STEM toys
- > Make learning about these amazing fields fun



## Reference List

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Science for Kids (NASA): <http://spaceplace.nasa.gov/>  
 Careers in STEM: [http://www.sciencebuddies.org/science-fair-projects/science\\_careers.shtml](http://www.sciencebuddies.org/science-fair-projects/science_careers.shtml)  
 Engineering Website for MS girls: <http://www.engineerit.org/>  
 Engineering Website for US girls: <http://www.engineeryourlife.org/>  
 All the Best Science and Math Activities: <http://www.howtosmile.org/>

### Articles:

Center for Research on Girls at the Laurel School Articles

"What is STEM – and why should you care?" by Carol Lloyd

"Why STEM?" by Brian Nichols

"Report: STEM Education Leads to Higher Paying Jobs, More Job Security" by Mary Ann Lopez

"STEM Careers: The Need to Get More Women Involved From the Start" by Lisa Hook

### Videos:

Women in Science Videos:

<http://science.education.nih.gov/home2.nsf/Educational+Resources/Grade+Levels+Middle+School/F4DC788C2DC8E548525733E0093F93F>

Video about Girls in Math and Science:

<http://www.youtube.com/watch?v=hKKe9bnAC8&feature=related>

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