STEM Volunteer Training: Engaging Activities

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Training Agenda

Welcome and Introduction
Puff Mobile Activity
Key elements of a STEM lesson
Preparation & Safety
FAQs by STEM Volunteers/Mentors
Sharing successful STEM activities
Sample lessons & tools highlighted on Dept. of Energy Education Website
Additional resources
Questions & Answers

Find this training and future on our website at:
http://www.energy.gov/diversity/services/stem-education

You are on mute!
Use your webinar bar to fill out poll, send a chat or send in a question.
Please tell us via chat if you cannot see or hear.
Welcome and Introduction

- **Vision:** To engage diverse students in conversations around STEM and introduce them to STEM professionals.

- **Strategy:** To help achieve the goal of involving Federal STEM Volunteers in 1,000,000 hours of volunteer STEM service.

- **Need:** To facilitate STEM Volunteer training and resources for professionals that want to contribute to a volunteer or mentoring effort

- **Result:** Establish Quarterly STEM Volunteer Virtual Training Series
Puff Mobile Supplies & Instructions:

Materials:
• 3 straws
• 4 lifesavers
• 1 piece of paper
• 2 paper clips
• 50 centimeters of tape

Instructions:
• Make a car out of the materials
• Blow on the car to make it move!

*Adapted from PBS Zoom http://pbskids.org/zoom/activities/index.html
Puff Mobile YouTube Video

https://www.youtube.com/watch?v=O2L2JAd4ucA
Puff Mobile activity from PBS Kids
Consider the Science Behind the Activity, and Key Vocabulary. Incorporate these into your learning targets, and try to gauge how many kids “get” it.

For Puff Mobile:
• Wind, a renewable and clean source of energy, is the force
• Wheels make work easier
• Kinetic energy is the energy of the object in motion
• Heavier objects and faster objects have more kinetic energy
Key Elements of a STEM Lesson

Introduction
• Make a career connection & give a real world application, or pose a challenge in a situation (tell a story) to spark interest
• Introduce learning objectives and key vocabulary

Hands-on activity:
• Ask questions to encourage curiosity and exploration
• Learn alongside youth and practice “hands-off” facilitation
• Provide specific feedback

Reflection:
• Have students reflect on their successes and challenges with the activity. Reflect back on learning objectives, and the steps of the Engineering Design Process.
• What did students learn and how that may have changed previous ideas/perspectives?
• How could they make it more challenging? Who can they share this with?

“Classroom” Management Strategies:
• Keep students engaged by asking questions and giving them specific jobs/roles
• Prepare materials ahead of time and have a plan for material distribution and collection
• Give instructions and have group discussions away from materials
• Engage all students equally, pay attention to the students that might be quieter
Safety First!

Activity Components –
• Are there small parts, flammables, sharp edges that are potentially dangerous?
• Consider the age range
• Ask about food or chemical allergies
• Identify any protective gear (goggles, gloves, etc.) or quick training needed.

Physical Space –
• Can all attendees see and experience the activity safely?
• You may need to rearrange furniture, split participants into small groups, etc.

Emergency Plan –
• Do you have a plan in case of a medical or other emergency?
• Identify in advance the location of fire extinguishers, exits, etc.
• Create a simple emergency plan as needed.
Equity and Inclusion

Physical Ability –
Is the activity accessible – and equally experienced – by participants of different physical abilities?
• Anticipate wheelchairs, different body sizes, visual limitations and more as you prepare and facilitate your activity.

Learning Styles –
Can diverse learners successfully experience the activity?
• Visual, auditory, hands-on and/or kinesthetic components can help engage diverse groups.

Demographics –
Is your presentation inclusive and respectful of diverse participants?
• Using gender-neutral pronouns and visuals with multiple skin tones are some ways to ensure participants feel included and represented.

Helping Out –
Does a participant need help?
• Asking questions first and/or addressing the whole group can be more effective than assuming.
FAQs by STEM Volunteer Mentors

- What if the activity is too easy?
- What if the activity is too hard?
- What if I see they are tuned out?
- Logistics (# in audience, room set-up, A/V & internet needs, time, behaviors, allergies)
Sharing Successful STEM Stories

Please share successful activities that you facilitated with your students in the chat box, including the scientific concept.
Smartphone Microscope

- Integrated STEM learning opportunity
- Approachable Technology
- Sustained Engagement
- Involvement of Agency Employees to act for STEM Outreach
- Cost-Effective

What Will You Discover Through Your DOE Lens?
Build a Pizza Box Solar Oven

- Scientific concept: The idea that the sun’s heat is energy that we can use to bake food. This simple solar oven project will get hot enough to warm up cookies or other treats, but not hot enough that it will be unsafe in any classroom.

- Objective: Build a solar oven that will warm a delicious treat!

- Activity: Groups of students will have a class period to build a solar oven using materials provided.

- Materials needed include: one pizza box for each student/group, tape, scissors, black construction paper, clear plastic wrap, aluminum foil, a piece of notebook paper, a pencil or pen, a ruler or a wooden dowel or a stick.

- Experiment: Give your solar oven a try on a sunny day and pick a treat to warm up. The activity should take 30 minutes.

- For detailed instructions please visit the link below on the DOE education website:

  http://www.energy.gov/sites/prod/files/2015/02/f20/PizzaBoxSolarOven.pdf
Build an Energy House

- Scientific concept: Students learn about energy conservation and efficiency by using various materials to insulate a cardboard house. Specifically, they learn about conductors vs insulators.
- Objective: Build a house that will keep the coolest measured by the melting of ice cubes!
- Activity: Groups of students will have 45 minutes to build a house using different insulating materials.
- Materials can include: identical cardboard boxes, sheets of heavy transparency film, poster boards, resealable quart-sized plastics bags, and rolls of masking tape. (most material can be bought at an office supply or hardware store)
- Experiment: Once built put ice cubes in our house and determine who keeps coolest after 10 minutes
Teach and Learn Lessons

http://www.energy.gov/eere/education/teach-and-learn
Additional Education Resources

- Department of Energy – http://www.energy.gov/education
- Engineering is Elementary – http://www.eie.org
- eGFI – http://teachers.egfi-k12.org/category/activities/
- Design Squad – http://pbskids.org/designsquad
- PBS SciGirls – http://www.pbslearningmedia.org/search/?q=scigirls
- Exploratorium – http://www.exploratorium.edu/explore/activities
- AAAS Communicating Science: Tools for Scientists and Engineers: http://www.aaas.org/pes/communicatingscience
- Teachengineering: https://www.teachengineering.org/
Washington, DC STEM Mentoring Café on Monday, February 8, 2016 from 3:30-6:00 PM at the National Geographic Museum.

STEM Mentoring Cafés are an effort to engage middle school students and their educators with STEM professionals through speed mentoring sessions with an opportunity for ongoing mentoring from federal employees.

**Educator/Student Registration Link:**
https://ngcpsurvey.typeform.com/to/CkUNRN

**STEM Professionals Registration Link:**
https://ngcpsurvey.typeform.com/to/ab85ip

Please register by Wednesday, February 3, 2016.
Email stemed@energy.gov with questions.
Questions and Contact Us

Email us: STEMED@energy.gov

Tweet and Facebook with us: #WomenInSTEM #STEMCafes

Find this training and presentation on our website at: http://www.energy.gov/diversity/services/stem-education
April 14, 2016 at 3 pm ET
Types of Volunteering and Where to Find Opportunities

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