

Professional Development Situation: Training

Skill Focus: Developing a STEM Identity

Time Required: 85 minutes

EXPLORING A STEM IDENTITY

Participants will engage in Building for the Big One to learn to develop STEM identities.

Agenda

Welcome—5 minutes

Introduction—10 minutes

See the Skill in Action—15 minutes

- [I Can Do STEM!](#) video-based learning module

Hands-On learning—40 minutes

- [Building for the Big One](#)

Conclusion—15 minutes

Materials

- Computer with Internet connection
- Projector and speakers
- Flip chart paper and markers
- Blank paper for name tents
- Pens for participants
- [I Can Do STEM!](#) video-based learning module
- Materials for [Building for the Big One](#)

Before the Session

- **Read this training guide** to become familiar with the content and allow time to personalize the activities to best suit your presentation style. Watch all videos and read informational materials.
 - *Italics indicate text that can be read aloud or emailed to participants.*

- Send reminder email about the training. Determine if any participants require accommodations (sight; hearing; etc.).
 - *The next professional development opportunity to enhance our STEM skills will be on DATE at TIME at LOCATION. Our focus for this session will be “Developing a STEM Identity”. Let me know if you require any accommodations to participate in the training. I am happy to answer any questions you have and look forward to seeing you at the workshop. I can be reached at CONTACT INFO.*
- Gather all materials needed for the training.
- Develop a list of possible questions participants might have during the training. Create potential responses to be explored through informal conversation. Review any key terms or ideas that may be unclear.
- On the day of the training, test the audio and video equipment.

Training Outline

Welcome (5 min)

- Greet participants as they arrive. Make sure everyone feels welcome and comfortable.
- Introduce yourself and the focus of the session: “Developing a STEM Identity”.
- Ensure participants are aware of the locations of restrooms facilities, refreshments, etc.

Introduction (10 min)

- Pass out blank paper to make name tents.
 - *On one side of the table tent, write what you think are parts of your identity. On the other, write your name.*
- Have participants share their name tents.
- Ask participants what they heard in the introductions that helps us understand what STEM identity is.
 - *What ideas do we have about what identity is?*
 - *What might a STEM identity look like for youth?*
 - Examples: An interest in STEM, pursuing STEM hobbies, curiosity
 - *Today, we will be looking at strategies for helping youth develop stronger identities with STEM. Youth need our assistance to guide them in finding their STEM identity.*

See the Skill in Action (5 min)

- Cue up the [I Can Do STEM!](#) video-based learning module.

- *Let's take a few minutes and watch a staff person who is facilitating a STEM activity with youth. Watch for the strategies she uses to support youth and encourage developing a STEM identity.*
- Show the video.
 - *How does she help youth practice STEM? (By taking on roles related to STEM)*
 - *How did youth respond to the activity?*
 - *How did the facilitator show that STEM is approachable?*
 - *How did the facilitator show that STEM is relevant?*
- Re-watch the video if necessary.

Hands-on Learning (40 min)

- For this portion of the training you will engage participants in the [Building for the Big One](#) design challenge in which different roles are given to each participant and they work together to design a tower that will withstand an “earthquake.”
- Complete the [Building for the Big One](#) design challenge.
- After they complete the challenge, discuss the following debrief questions:
 - *Did you come to identify with your role? Do you feel like your role on this project suited you?*
 - *What about this project might resonate with your youth?*
 - *How can it be helpful to give youth a role related to a STEM career?*
 - *How might youths' interests and real-world experiences connect to these identity-building moments?*

Conclusion (15 min)

- *Today, we reviewed a few ways that giving youth roles in STEM can help them develop a STEM identity. Let's think back to the things you wrote on your name tents. What are the things that you do that relate to STEM that you could add to your nametag? Think broadly – what are the ways you design things? Figure things out? Use your knowledge about the way the world works?*
- Give participants time to add elements of STEM identity to their nametag.
- Have participants share their nametags again.
 - *Today, you have learned two strategies for engaging youths' identities in STEM: 1) by using roles in activities and 2) by highlighting their expertise and interest in STEM. Try to use these strategies in an upcoming session to help youth start to see themselves as capable of doing great STEM work.*

After the Session

- Within 2-3 weeks of the training, email to all participants. .
 - *Thank you for your participation in the recent Click2Science training on Developing STEM Identity. I hope you found it useful. Consider meeting with a co-worker, supervisor, or friend to share what you learned. I look forward to continuing our learning at the next session on SKILL/FOCUS on DATE at TIME at LOCATION. Please let me know if you have any questions. I can be reached at CONTACT INFO.*

Want to Earn Credit? Click2Science has teamed up with Better Kid Care to provide continuing education units. Check it out at: <http://www.click2sciencepd.org/web-lessons/about>

Building for the Big One

Courtesy of Techbridge Girls, Inc.

Materials:

- Assemble the following into a bag for each group to use for the challenge:
 - 20 popsicle sticks
 - 1 roll of masking tape
 - 1 golf ball
 - 1 ruler
 - 1 aluminum 8-inch round baking pan
 - Scratch paper
 - [Soil types handout](#)

Introduction & Preparation

- Hand out the bags of supplies that you assembled in advance.
 - Today we will each be taking on one of these roles: geologist, architect, or structural engineer.
- Pass out [Roles Nametags](#) to each group. Determine who will be taking each role.

Roles

- Geologist—research and create the group’s soil type: bedrock, alluvium, gravel, or landfill. Use the soils type handout for information. Advise the architect and structural engineer on the design of the structure based on information gathered about soil type. Take the lead in making the soil in the aluminum pan.
- Architect—design the structure based on the required specifications. Work with the geologist to determine if the design will work with the group’s specific soil type.
- Structural Engineer(s)—build the structure based on the architect’s design and geologist’s recommendation.

Criteria

- Here are the rules and specifications for the structures:
- The structure can be built only with 20 Popsicle sticks and masking tape.
- The structure must be at least 2 Popsicle sticks tall.
- The structure must hold a person (represented by a golf ball) without shaking them off or out of the structure **while we test it in an “earthquake” Testing Zone.**
- The base of the structure must fit into the aluminum-baking pan.

- The structure must be able to withstand 15 seconds of shaking in the Testing Zone without falling or collapsing.
- Soil types are assigned as follows; Group 1, bedrock; group 2, alluvium; group 3, gravel; and group 4, landfill.
 - Bedrock groups receive Play-Doh
 - Alluvium groups receive Grape Nuts and water
 - Gravel groups receive Grape Nuts
 - Landfill groups receive 1 ½ cup of cornstarch + 1 cup of water

Design and Build

- Groups have 10 minutes to brainstorm and design. The geologist will research the group's soil type and how to make the soil mixture. The architect consults the geologist and draws up a design of the structure based on the required specifications. As a group, you will work through your design and send your geologist to get your soil and supplies. The structural engineer plans ahead of time how he/she will construct the structure.
- When groups have set a plan, they get 15 minutes to build the structures. At the conclusion of 15 minutes, have groups gather at the testing zone, where each group will participate in testing its structure. Structures should be placed into the pan filled with the correct soil type, placed within the testing zone, and shaken for at least 15 seconds.

Debrief

- How did the structures hold up?
- What design practices did we use?
- How did the individual roles work when developing the plan?
- In what ways did the different scientists and engineers work together?

Roles Nametags



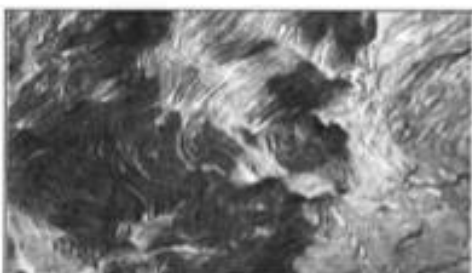
Handout – Building for the Big One

Directions: Cut out and laminate the cards below and then attach them to a lanyard. Have each youth wear the card for the role he/she has been assigned.

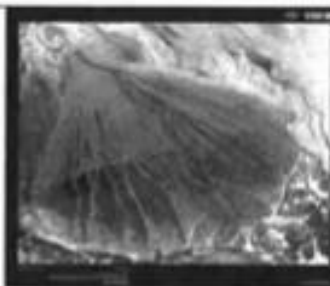
<h1>Geologist</h1>	<p>The Geologist in the group will research and create the group's soil type: bedrock, alluvium, gravel, or landfill.</p> <p>Soil Recipes:</p> <ul style="list-style-type: none"> • Bedrock = Playdough • Alluvium Pan = Grapenuts + enough water to soak them, but not fill the pan • Gravel Pan = Dry Grapenuts • Land fill = Oobleck (1 ½ cups of cornstarch + 1 cup water)
<h1>Architect</h1>	<p>The Architect in the group will design a structure that meets the following parameters:</p> <p>Parameters:</p> <ul style="list-style-type: none"> • Structures must be at least two Popsicle sticks tall. • Structures must hold a golf ball without shaking it out of the structure. • Structures must fit in a pan. • Structures must be able to withstand 15 seconds of shaking without falling or collapsing (on shake table).
<h1>Structural Engineer</h1>	<p>The Structural Engineer(s) will build the structure using popsicle sticks and 2 hot glue sticks. Their structure must be based on the Architect's design and the Geologist's recommendations.</p>
<h1>Structural Engineer</h1>	<p>The Structural Engineer(s) will build the structure using popsicle sticks and 2 hot glue sticks. Their structure must be based on the Architect's design and the Geologist's recommendations.</p>

Soil Types

Handout – Building for the Big One



Bedrock is the solid unweathered rock that makes up the Earth's crust. The Earth's outermost surface is called the crust. Bedrock may be composed of various elements from region to region. There are three major groups of bedrock: sedimentary, metamorphic, and igneous, each made of different sets of minerals.



Alluvium is young sediment—freshly eroded rock particles that have come off the hillside and been carried by streams. Alluvium is pounded and ground into finer and finer grains each time it moves downstream. Alluvium is typically made up of a variety of materials, including fine particles of clay and larger particles of sand and gravel.



Gravel is any loose rock that is at least 2mm and no more than 75mm. It can be a mixture of sand, clay, and small pieces of rock. It is sedimentary rock and usually found where there is, or were, rivers, lakes, and glaciers. It happens where rocks have been weathered by wind or water or eroded.



A **land fill** is a site for the disposal of waste materials by burial such that it will be isolated from groundwater and will not be in contact with air. Under these conditions, trash will not decompose much. Unless landfills are stabilized, these areas may experience severe shaking in a large earthquake.

Testing Set-Up

Preparation:

Set up the Testing Zone by placing golf balls in a rectangular pie pan to make the shake table. The structures built by students will be placed in a pie pan on the shake table, which will be agitated back and forth for 15 seconds to simulate an earthquake. Lay out the stop watch and paper towels (for cleanup).

