Portal to the Public (PoP) Training for Teen Science Café Scientists

Learning Through Play

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Category: How People Learn

Approximate Length: 60 min.

Format: In-person workshop

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Main Idea:
A great deal of learning happens through play. To set the stage for a Teen Science Café, it is important that playfulness supersedes academics. Creating an active learning environment is essential. Participants can discover evidence and ideas, make observations, grow their understanding, and set context through their active, enjoyable involvement.

Relevant Objectives:

- Incorporating playful discovery into Teen Science Cafes will achieve the goal of promoting a playful and thoughtful environment, instead of a more formal, academic environment.
- Scientists will experience (or be reminded of) the value of playful discovery.
- Scientists will be challenged to find ways to incorporate playfulness into the conversation of their work at the café.

How it relates to other PD elements:
This element will work well when the scientist connects and integrates the ideas into their development of their presentation (stories!) and accompanying hands-on activity. This element aligns nicely with Concept Mapping. This element works well as the first element in a Teen Café scientist workshop, before Story-Weaving and Improv. This element is related to Meaning Making, Personal Learning, Pleasure of Finding Things Out, Concept Mapping, Materials Development for PoP Programs, and One-on-One Activity Development.

Assumed Prior Knowledge and Experience:

We assume that scientists entered into their field of study through curiosity, engagement, and their own personal playful learning.

We assume that scientists are open to different approaches to learning (formal vs. informal, playful vs. academic, etc.), to broader ideas of positive learning outcomes (thoughtful behavior and engagement vs. specific content knowledge, etc.), and to methods for engaging teen audiences (active, relevant, playful, etc.).

Room Setup and Materials Preparation

1. Cut out scenarios for Part 3a. Each table (up to 4 scientists) should get one complete set.
2. Make copies of Least/Most Impactful and Least/Most Playful spectrum. Half of the groups gets one spectrum, the other half gets the other spectrum.
3. Cover tables in painter's plastic or newspaper or butcher paper.
4. Mix up a bowl of oobleck for each group of scientists. Approximate ratios:
   1 cup water; 1.5-2 cups cornstarch; few drops of food coloring, if desired
5. Gather materials for spacecraft models (e.g., popsicle sticks, cardboard, paper, etc.).

Background for Activity

From Scientific American: It's a Solid... It's a Liquid... It's Oobleck!: Bring Science Home: Activity
By Katherine Harmon on May 2, 2011

"Other, more familiar substances change states (from solids to liquids to gases) when we change the temperature, such as freezing water into ice or boiling it away into steam. But this simple mixture shows how changes in pressure, instead of temperature, can change the properties of some materials.

Applying pressure to the mixture increases its viscosity (thickness). A quick tap on the surface of Oobleck will make it feel hard, because it forces the cornstarch particles together. But dip your hand slowly into the mix, and see what happens—your fingers slide in as easily as through water. Moving slowly gives the cornstarch particles time to move out of the way.

Oobleck and other pressure-dependent substances (such as Silly Putty and quicksand) are not liquids such as water or oil. They are known as non-Newtonian fluids. This substance's funny name comes from a Dr. Seuss book called Bartholomew and the Oobleck."

PROCESS:
Introduction

- **Ask: "What do you associate with the word "play"?**
    - Participants write a word on each 5x8 inch post-it and affix them on the wall to offer thoughts on the word "play," with the goal of revealing people's conceptions about play and the value of play (< 5 minutes). Participants can contribute multiple words (each on a separate sticky note) if they desire. NOTE FOR FACILITATOR: affix post-its at location on wall near where responses in Part 2 will be written.

Part 1: Activity - Playful Discovery (15 minutes)

- **Experience the fun and impact of a hands-on experience**
    - The Challenge: To develop a spaceship that will land on an Oobleck planet, explore the planet, and take off with passengers aboard (inspiration and adaptation from Lawrence Hall of Science GEMS Oobleck).
    - Scientists, working in teams, will have a bowl of Oobleck (cornstarch and water). They should try to discover some of the properties of the planet surface.
    - Scientists should make drawings of a spacecraft they would use. Drawings should include labels for features of their spacecraft (what parts do and why). Have available recyclable/repurposed materials for scientists to experiment with to envision their spacecraft and from which they will make their drawings and describe their spacecraft's features to the whole group.
    - FACILITATOR TIP: While groups are working on designing their spacecrafts, rearrange sticky notes on wall to highlight common themes/words (e.g., fun, social aspect, creativity, etc.).
- **To abbreviate this section, each team would not share out with other teams and the assumption would be that enough discussion took place within their individual teams.**

Part 2: Reflection and Discussion (15 minutes)

Regain the focus of the whole group. Ask the group, "What was learned through this playful experience?" Chart responses for everyone to see (dry erase, chart paper, etc.).

It is likely that the answers will fall into two categories - those from the perspective of a learner and those from the perspective of a facilitator/educator. We will want to focus on the latter, however responses to the former will be a useful part of the discussion.

Facilitator/Educator responses might include:

- participants determined a number of the properties of Oobleck
- participants came up with creative solutions to the challenge
- oobleck is fun

- oobleck is messy
- everyone was engaged/involved
- the activity activated participants prior knowledge and experience

Ask the group, "What was lost in this experience relative to a traditional lecture regarding the States of Matter?".

- participants did not say the words "non-Newtonian fluid" (did not use the precise scientific vocabulary)
- all of the current understanding of topic was not necessarily addressed
- it was not linear
- learning outcomes would not be able to be assessed in a traditional way

Ask the group, "What are any additional potential pros and cons of presenting science this way?"

- people want the right answer (some people at least)
- threat that people will be distracted or go off on tangent instead of focusing on content area at hand
- challenging to keep students focused on content you think they should be learning
- activities take more time than more teacher-centered approaches
- gave everyone an opportunity to be involved
- low stakes; no right or wrong answer

Ask the group, "What do you think are the motivations of youth attending a teen science cafe and why would it make sense to cultivate a playful environment when communicating science with them?"

If time, ask:
"How does this compare to the our initial post-its regarding "play"?"

Part 3: Evaluating Activities (15 min.)

a. How is a topic playful/impactful?

Each table should have a set of the following six scenarios to sort. Half of the participants in a workshop would rate the examples from Least Impactful to Most Impactful. The other half would rate the same examples from Least Playful to Most Playful. They do not need to know that the other half is rating with a different criterion. It may be interesting to see where overlap lies or does not lie.

Scenario Cards (to print, cut and distribute):

Samples on each table - Presenter would have labeled rocks on each table.	**Role play** Astronaut on Mars who lands in dry river bed and has external monologue where she/he asks herself/himself scientific questions or voices scientific train of thought to prove that she/he landed in a dry river bed, the rocks are from X location, are affected by x climate forces, etc
Samples shown/held up - Presenter shows rocks either actually or virtually during their presentation representing their research.	**Open-ended scavenger hunt -** presenter has pictures or samples and gives students a worksheet which challenges them to find the heaviest rock in the room, or one that could have been formed in a river bed, or through vulcanism...
Samples are on each table and students are prompted to pointedly engage with the samples - Presenter would have rocks on each table and would ask attendees to speculate or make observations regarding questions or prompts from the presenter about each sample.	**Tour -** a walk through and talk regarding a rock and mineral collection

b. What is or could be playful about your research? Or what could be playful about the way you present your research? (15 minutes)

Participants should work in pairs or groups of up to 4 people to

- describe their work
- evaluate their ideas for activities (from the Scientist Preparation worksheet) in light of what they have just experienced and discussed
- brainstorm play points (or discovery points - what about their work is discoverable by cafe attendees, or ways to actively involve the whole group at the cafe, or..)

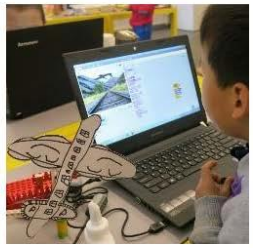
- each Scientist charts their playful ideas and present to the rest of the group at the workshop. (Scientists take their charts)

Materials:
5″ x 8″ post-its
markers
buckets of oobleck (cornstarch, water, shallow plastic containers - minimum 6″ squares, food coloring if desired)
spoons
popsicle sticks
pipe cleaners
yogurt containers
caps and lids
egg crates
card stock
cardboard pieces - smaller than 1'x1' - variety of shapes
corks
beads
feathers
scissors
glue
tape
table protection materials (newspaper, butcher paper, painter's plastic)
chart paper
chart markers
photocopies of playful/impactful spectra
photocopies of PLAY DATA

When we play, we are . . .

Motivated by our own interest

Actively engaged (hands-on)



Challenged at our own level

Experimenting Taking risks

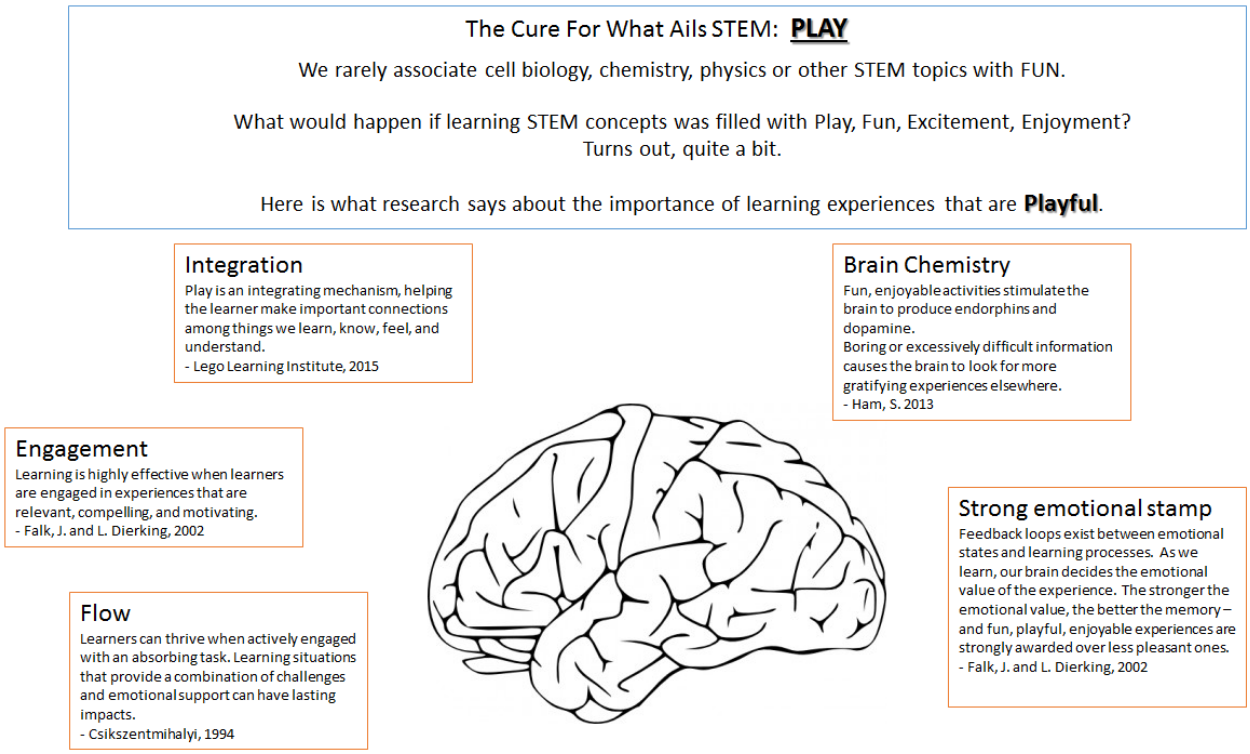
The LEGO Foundation

Less
Playful

More
Playful

Less
Impactful

More
Impactful



Sources

Csikszentmihalyi, Mihaly (1994). *The Evolving Self*. New York: Harper Perennial.

Falk, J. H., & Dierking, L. D. (2002). *Lessons without limit: How free-choice learning is transforming education*. Lanham, MD: AltaMira Press.

Ham, Sam H. (2013). *Interpretation: Making a Difference on Purpose.* Fulcrum Publishing.

The LEGO Foundation. http://www.legofoundation.com/it-it/research-and-learning/foundation-research/the-future-of-play