

Professional Development Situation: Training**Skill Focus: Enabling Active STEM Learning****Time Required: 60 minutes**

DEVELOPING AN ACTIVE STEM LEARNING ENVIRONMENT

Participants will compare Glurch and Oobleck to learn how to engage youth in active learning.

Agenda

Welcome—5 minutes

Introduction—20 minutes

- [Active STEM Reflection](#)

See the Skill in Action—10 minutes

- [Active Engagement by Youth](#) video-based learning module

Hands-On Learning—20 minutes

- [Glurch & Oobleck Recipes](#)
- [Tournament of Properties](#)

Conclusion—5 minutes

Materials

- Computer with internet connection
- Projector and speakers
- Flip chart paper and markers
- Stack of blank paper (for name tents and notes)
- Pens for participants
- One copy of [Active STEM Reflection](#) for each participant
- [Active Engagement by Youth](#) video-based learning module
- Materials for [Glurch & Oobleck Recipes](#)
- One copy of [Tournament of Properties](#) for each participant

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 “Enabling Active STEM Learning”. 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: “Enabling Active STEM Learning”.
- Ensure participants are aware of the locations of restrooms facilities, refreshments, etc.
- Have each participant make a name tent with their name on one side

Introduction (20 min)

- Pass out the [Active STEM Reflection](#) to each participant. Flip a new piece of chart paper and write “ACTIVE LEARNING” at the top. Ask participants to help define it.
 - *Today we will be talking about active learning as the opposite of passive learning. What do I mean when I say “active” learning?*
 - Possible responses: hands-on, the youth are doing the work, the youth are talking, the adult is guiding
- Give participants a few minutes to complete the [Active STEM Reflection](#) on their own.
- Have participants interview each other.

- *Ask your elbow partner to explain their recent experiences with active STEM learning.*
- As a whole group, share interesting experiences that participants heard.
 - *Who would like to nominate their interviewee for the “Most Interesting Person” award? What did your interviewees try out?*

See the Skill in Action (10 min)

- Cue up the [Active Engagement by Youth](#) video-based learning module.
 - *We are now going to see an active engagement experience where the young people are active in their learning.*
- Watch the activity overview video.
- Watch the video in step 3.
 - If requested, pause or re-play the second video to let participants see what the staff are doing.
- Debrief. Remind participants that this is not perfect practice, but it is *actual* practice.
 - *What does the staff member do well?*
 - *What could the staff member do better?*
- You will now transition to doing the Glurch and Oobleck challenge as a room.

Hands-on Learning (20 min)

- Split the room into groups of four.
- Assign half of the groups to be “Oobleck” and half to make “Glurch.”
- Pass out the [Glurch & Oobleck Recipes](#) and materials for each group to make their assigned material.
- Allow 10 minutes to make the material and:
 - *Write down as many **adjectives** as they possibly can about their material.*
 - *Write any **questions** that come to mind.*

Tournament of Properties

- Pass out the [Tournament of Properties](#) handout to each participant.
- Pair each Glurch group with an Oobleck group and have them compete to see which material is more viscous, fluid, and elastic.
- Debrief this activity as a whole group. Return to the list of adjectives you made on chart paper at the beginning of the session.
 - *Did this activity allow for each of these elements of active learning?*
 - *How is this activity an example of hands-on, active learning?*

- *What could we do to turn this into an investigation?*
- *How could we make this activity more open-ended and less step-by-step?*

Conclusion (5 min)

- Conclude by sharing that active, hands-on, “minds-on” learning is an important part of youth development work and a necessary part of STEM.

After the Session

- From notes you took on the pieces of chart paper, compile a list of strategies for organizing, recording and documenting experiments/experiences shared by the group. Share this in your follow-up email to participants.
- Within 2-3 weeks of the training, email participants:
 - *Thank you for your participation in the recent Click2Science training on “Enabling Active STEM Learning”. I hope you found it useful. Attached are some strategies the group discussed during the training. 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>

Active STEM Reflection

Describe a recent experience you had with children in your program that used “Active STEM Learning”.

- How did you decide to do this particular experience? (Your idea, children’s idea, both?)
- What materials were used?
- What space was used?
- What things did you say and do?
- What things did the children say and do?
- What did you like/dislike about the experience

Glurch & Oobleck Recipes

NOTE: You will want to wear safety goggles while mixing these materials, especially Glurch due to Borax and its corrosive nature.

Glurch is a colloid that has the consistency of putty. You can experiment with this recipe by adding more or less of the powder.

Materials:

- 2 teaspoons Borax powder
- 1 cup warm water
- 2 cups white glue
- $1\frac{1}{2}$ cups cool water
- 2 bowls
- 1 Spoon

Preparation:

- Measure 2 teaspoons of the Borax into a bowl.
- Measure 1 cup of warm water and pour it into the Borax powder. Stir until dissolved. Set aside.
- Measure 2 cups of glue and pour it into another bowl.
- Measure $1\frac{1}{2}$ cups of cool water and pour it into the bowl with the glue-mix well.
- Pour the Borax and water mixture into the glue. Mix with your hands or a spoon.

Oobleck is a colloid that moves from a solid to a liquid and back again. A fluid that is a little solid and a little liquid is called a non-Newtonian fluid.

Materials:

- 1 cup water
- $1\frac{1}{2}$ cups cornstarch
- 1 mixing bowl
- 1 spoon

Preparation:

- Pour 1 cup of water into a mixing bowl.
- Measure out $1\frac{1}{2}$ cups of cornstarch. Add cornstarch 1 tablespoon at a time, mixing it in between until it becomes difficult to stir.
- Once you achieve this Oobleck mixture scoop some up with your hand, and watch how it oozes back into the bowl. Use your fist to punch the ooze. You might expect ooze to fly everywhere – but it doesn't.

Tournament of Properties

Glurch v. Oobleck

Resiliency (elasticity)

	Will Bounce Higher	Will Stretch Longer
Glurch		
Oobleck		

More resilient: _____

Viscosity (stickiness)

	Picks up more newsprint	Glues 2 pieces of paper together more strongly
Glurch		
Oobleck		

More Viscid: _____

Fluidity (ability to flow)

	Flows faster	Squeezes through fingers more easily when pinched
Glurch		
Oobleck		

More Fluid: _____