Professional Development Situation: Training

Skill Focus: Encouraging Collaborative STEM Work

Time Required: 50 minutes

TEAMING UP FOR SUCCESS

Participants will watch the "Modeling Effective Collaboration" video-based learning module and the Okefenokee Engineering Challenge in order to understand how engineers collaborate.

Agenda

See the Skill in Action—15 minutes

- Modeling Effective Collaboration video-based learning module

Hands-On Learning—20 minutes

- Okefenokee Engineering Challenge

Debrief —10 minutes

Conclusion—5 minutes

Materials

- Computer with Internet connection
- Projector and speakers
- Flip chart paper and markers
- Modeling Effective Collaboration video-based learning module
- One copy of Elements of Inclusive Investigations for each participant
- One copy of Okefenokee Engineering Challenge for each participant
- One Newspaper for each participant
- 6" ruler for measuring final designs

Before the Session

- **Review 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 "Encouraging Collaborative STEM Work." 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

See the Skill in Action: Modeling Effective Collaboration (15 min)

- Display the quote:
    - *"Nothing enters the mind that hasn't been in the hands." – Socrates.*
- Ask participants to discuss the meaning of this quote and give an example of something they learned by doing.
- Introduce the goal of today's session – to practice collaborating with each other.
- Ask participants to discuss what collaboration means. Write a list of these on chart paper, a whiteboard, or a digital projection.
    - *What does it look like when people collaborate?*
    - *What does it sound like when people collaborate?*
    - *What kinds of statements do people say when they collaborate?*
- Show the video of Modeling Effective Collaboration (step 3).
- Pass out the Elements of Inclusive Investigations handout.
    - *Which of these efforts toward inclusiveness could be attempted in the activity you saw here?*

Hands-on Learning (20 min)

- Help participants form small groups. The group size should be small enough so they can successfully complete the activity, but large enough that no one is working alone.
- Each person in the group gets one newspaper to share with their team. Give each group a long strip of masking tape.
- Arrange the groups so that they have space to work.
- Have a participant read the Okefenokee Engineering Challenge.

- *Your team is stranded in the Okefenokee Swamp where a new species of people-eating alligator lives. You know that the gators will attack after dark (in 20 minutes) and that your team will only be safe if the entire team is 6 inches above the swamp floor. There are no trees or other structures to climb; you are surrounded by grass. The only supplies you have with you are newspapers and masking tape.*
- ***The task**: Build a structure that will support your entire team 6 inches off the ground for 10 seconds (the time it takes the gators to get bored and walk away).*

- Remind participants that to be successful they will have to work together.
- Give participants time to work on their project.
- Support participants through open-ended questioning:
  - *Have you tested it?*
  - *What kinds of shapes might be most supportive? (columns, triangles).*
  - *How could you make paper stronger?*
- **Test the designs.** Ask each group to demonstrate its device. Measure its height (it should be 6" tall). To test the device, everyone in the team must place at least one foot on the platform and hold each other in place as they step up and (quickly) count to 10.
- **How to succeed at the challenge**: In order to be successful in this activity, the teams must figure out that they need to roll the newspapers into short, stout columns or triangles and tape them together into a small platform.
- If a team is successful, congratulate them. If their design fails, applaud them, too.
  - *Failure is a wonderful thing. We learn as much from our failures, if not more, as our successes. Let's give this failure some applause!*

Debrief (10 min)

- Ask the group to reflect on their learning.
  - *Why was collaboration so important in this activity?*
    - Everyone contributed in some way to the design.
    - With each trial of the device, participants recommended improvements that the group agreed upon.
    - The final part of the activity (stepping on the device) would be impossible to do without collaborating.
  - *What were some of the elements of collaboration?*
    - The teams communicated their ideas through words and by showing items.
    - The teams worked together to build the device in a set time.
    - The teams worked together to get everyone on the device—even for a short time.

        - We included everyone—the entire team.
        - We listened to each other
        - We avoided harsh criticism
    - *How was science present in this task?*
        - The properties of paper
        - The physics of balancing
        - Principles of design (columns, density, etc.)

Conclusion (5 min)

- Connect the work to authentic scientists' and engineers' activity.
    - *In real-world STEM, the stereotype of the mad scientist working alone in a lab just does not exist. Real-world STEM requires real-world skills—like collaboration.*
    - *The ability to collaborate—to share and improve on each other's ideas, to work together to solve problems, to create a shared vision, and to make the team's goal central is essential. It would have been very difficult, if it was possible at all, to get all of the team members off the ground without collaborating. By working together and by putting the team's goal first, you were either successful or on your way to success.*
- Look back at the list of elements of collaboration created earlier.
    - *Is there anything that you can add to that list? Anything you would remove?*
- Ask participants to **make a commitment** to trying one of these strategies this week. Share that commitment with their elbow partner.

After the Session

- Type up the lists that the participants created.
- Email the participants:
    - *Thank you for your participation in the recent Click2Science training on "Encouraging Collaborative STEM Work". Attached are the charts we created and the Okefenokee Engineering Challenge. I hope you found something to try out in the session. Consider meeting with a co-worker, supervisor, or friend to share the goals you are working on. 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

Okefenokee Engineering Challenge

This is an engineering challenge. Pay attention to how your group collaborates as you complete this activity.

Your team is stranded in the Okefenokee Swamp where a new species of *people-eating alligator* lives. You know that the gators will attack after dark (in 20 minutes) and that your team will only be safe if the entire team is 6 inches above the swamp floor. There are no trees or other structures to climb; you are surrounded by grass. The only supplies you have with you are newspapers and masking tape.

The task: Build a structure that will support your entire team 6 inches off the ground for 10 seconds (the time it takes the gators to get bored and walk away).

Elements of Inclusive Investigations

When you want to emphasize:	Try:
Use of scientific practices	Make all science terms clear by writing them on the board; use pictures or gestures to illustrate each practice (e.g., pointing to eyes for "observation")
Use of engineering practices	Group youth in ways that allow everyone to use the materials.
Encouraging Trial and Error	Encourage youth to test and re-test hypotheses without judgment or evaluation of right or wrong. Mistakes are used as opportunities for learning.
Maintaining a relaxed, supportive environment	Pre-teach kind and inclusive tones of voice, use of manners, sharing of materials. Keep any pressure (such as time constraints) positive.
Constructive criticism used in a helpful manner to 'push thinking' forward	Use phrases that validate children's efforts and help them think ahead ("Tell me what you're gonna try next," "How do you feel about your design so far?")
Conflicts are resolved in respectful manner	During conflict, have each person share their viewpoint, their feelings, and possible solutions. Follow through on resolutions and moving past the conflict.
Teamwork/Cooperation is used	Evidence of children evenly distributing their participation (nobody dominates an activity); multiple perspectives are welcomed.
Emotionally 'safe'	If a child shows negative emotions (lashing out; loud or hurtful tone; sad; etc.) staff work with them to calm them down and help them return to appropriate behaviors within the group setting.