Professional Development Situation: Training

Skill Focus: Reflecting and Processing STEM Experiences

Time Required: 90 minutes

REFLECTING THROUGH "PLUSSING"

Participants will see "plussing" and reflect on the Sand & Funnel activity to learn to engage youth in reflection.

Agenda

Welcome—5 minutes

Introduction—15 minutes

- Silhouette Activity
- Self-Reflection: Reflecting and Processing STEM Experiences

See the Skill in Action—20 minutes

- Making Meaning from STEM Learning video-based learning module
- Transcript

Hands-on Learning and Practice—20 minutes

- Funnel & Sand Investigation

Reflection—15 minutes

Conclusion—15 minutes

- SMART Goals Action Plan

Materials

- Computer with Internet connection
- Projector and speakers
- Flip chart paper & markers
- Pens for participants
- Silhouette Images
- Materials for each group to do the Funnel & Sand Investigation

  - Small tub
  - Two Funnels (1) small (1) large
  - Plastic tubing (at least 12 inches and diameter should fit well with the funnels)
  - Fine Sand
- Copies of materials for each participant:
  - Self-Reflection: Reflecting and Processing STEM Experiences
  - SMART Goals Action Plan
  - Transcript
- Making Meaning from STEM Learning video-based learning module

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 "Reflecting and Processing STEM Experiences." 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.
- Test the audio/video equipment on the day of the training to be sure it works.

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: reflecting and processing STEM learning.
- Ensure participants are aware of the locations of restrooms facilities, refreshments, etc.

Introduction (15 min)

- Display the silhouette images in a PowerPoint or printout.
- **Have participants build name tents** using the silhouette.
    - *Fold your name tent and write on it so your name is on one side. On the other side, write down answers to these questions:*
        - *What is reflection?*
        - *How do you use reflection in your setting? (on your own, with youth, etc.)*
- Have participants turn to their elbow partner.
    - *Ask your partner, "What did you see in the image? Is there anything else you can find? Why did you see what you saw?"*
- Now ask the room to share what their **partner** saw (not what they saw.)
    - *Did anyone have new ideas by hearing from their partner?*
- **Introduce the purpose** of self-reflection.
    - *An important aspect of reflecting and processing includes listening and understanding other people's viewpoints. Often times, we have a better picture or deeper understanding of a situation when we hear what other people saw and how they interpreted the information.*
- Hand out the Self-Reflection: Reflecting and Processing STEM Experiences.
- Ask participants to complete it honestly – it is not an evaluation but rather a learning tool.
    - *How did this self-reflection feel to complete?*
- Tell participants we will return to this reflection at the end of the session.

See the Skill in Action (20 min)

- Cue up the Making Meaning from STEM Learning video-based learning module.
- Tell participants they will watch for a reflection strategy called "plussing."
- Play the video under step 3.
- Ask participants what they noticed.
    - *What did you see the staff member doing with youth? What is plussing?*
- Pass out the transcript for the reflection section of the video (transcript highlights the "plussing" talk moves beginning at [1:37].
    - *We will watch the video again. This time, pay attention to what staff say when they are working with youth. In particular, you will see them use "plussing", which is a reflection strategy that you can use to help youth make sense of their learning together.*
- Re-watch the video.
    - *What does "plussing" seem to be?*
    - *What does "plussing" help youth do? (Ask participants to give evidence for their ideas.)*

    - *Why is it valuable?*
- Transition to hands-on learning.
    - *Today we will develop strategies like "plussing" that you can use to help youth process their learning. When we hear and see our own reactions to STEM learning, we want to offer many opportunities for learners to reflect with one another to process their understandings. It is also good for us, as facilitators, to reflect and process alone and with others in a similar manner.*

Hands-on Learning (20 min)

- Participants will be engaging in a hands-on activity with sand and funnels. Divide them into groups of four.
- Distribute the materials so that each group has enough to work with.

Sand and Funnel Investigation

- Fill the tub at least half-full of sand.
- Generate a list of questions about the materials with learners. Decide on one question to explore. (Ex. What will happen when you fill the funnel with sand?)
- Record predictions related to these questions using a journal or scratch paper.
- Connect the tubing to one of the funnels. Fill the funnel with sand. Allow some of the sand to travel down the tube then put the open end of the tube into the sand.
    a. What happens?
- Experiment and write down different observations and conclusions about the material sand what can be done with them.
    a. What happened when the funnel was filled with sand?
    b. Was this different than your prediction? Why or why not?
    c. Were these things different or the same as others in your group?
        i. Your prediction
        ii. Ways you manipulated the materials
        iii. Ideas about what happened and why
        iv. What would your group do next? (What materials, research, resources, etc. would they want to understand)

Reflection (15 min)

- Ask participants to think about the steps of that activity.
    - *What steps were there to that activity? Did you notice them?*
        - *(Introduction, developing questions/predictions, trying it out, and reflection)*

- Ask participants to brainstorm ways youth might reflect on their learning in the sand activity. They might include:
    - *Writing in a journal*
    - *Drawing a picture of what they would do next*
    - *Plussing*
    - *Asking youth to nominate a group member for "Most Valuable Partner" award for being supportive, using manners, etc.*
    - *Explaining what happened to a partner*
    - *Writing three things they want to try next time*
    - *Thinking of 3 tools or materials they would want to use if we did this activity again*.

Conclusion (15 min)

- *Now let's use those skills of **reflecting alone, with a partner and the whole group** to demonstrate how this might be done in the classroom with learners.*
- Ask participants to write down a strategy they currently use (or think they could) to Reflect and Process STEM experiences in your setting.
    - *Share this with your elbow partner*.
- Ask them to **review their** Reflecting and Processing STEM Self- Reflection.
    - *For any items you circled a 1, 2, or 3, consider developing 1-3 SMART (specific, measurable, achievable, relevant, and timely) goals to focus on throughout the next few weeks.*
- Guide participants to think about the **time, materials, and questions to ask youth** to support them to reflect on their learning. Think about whether "plussing" might be a useful strategy for your site.
    - *Use the SMART Goals Action Plan to record your goals.*
- Set SMART goals. Remember that SMART goals should be:
    - **Specific** – It is clear what you are trying to accomplish (what do we care about?)
    - **Measurable** – You will know when you've accomplished your goal
    - **Achievable** – You can do this because the goal is not too big or too small
    - **Relevant** – The goal relates to this skill and what you do in your program
    - **Timely** – The goal can be accomplished this month

After the Session

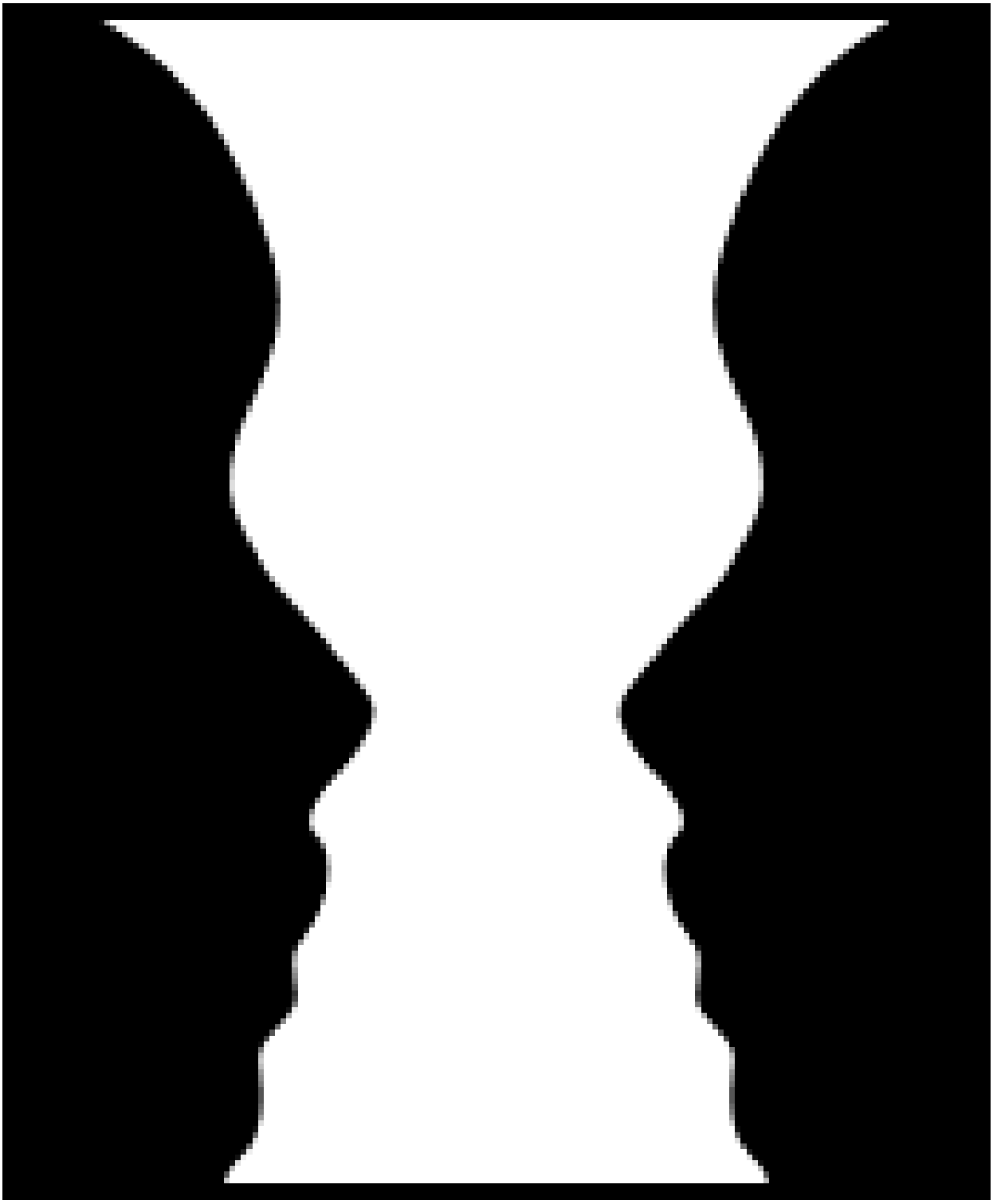
- From the discussion of what strategies for reflection are useful, compile a list of strategies to share with participants. Share this in your follow-up email to participants.

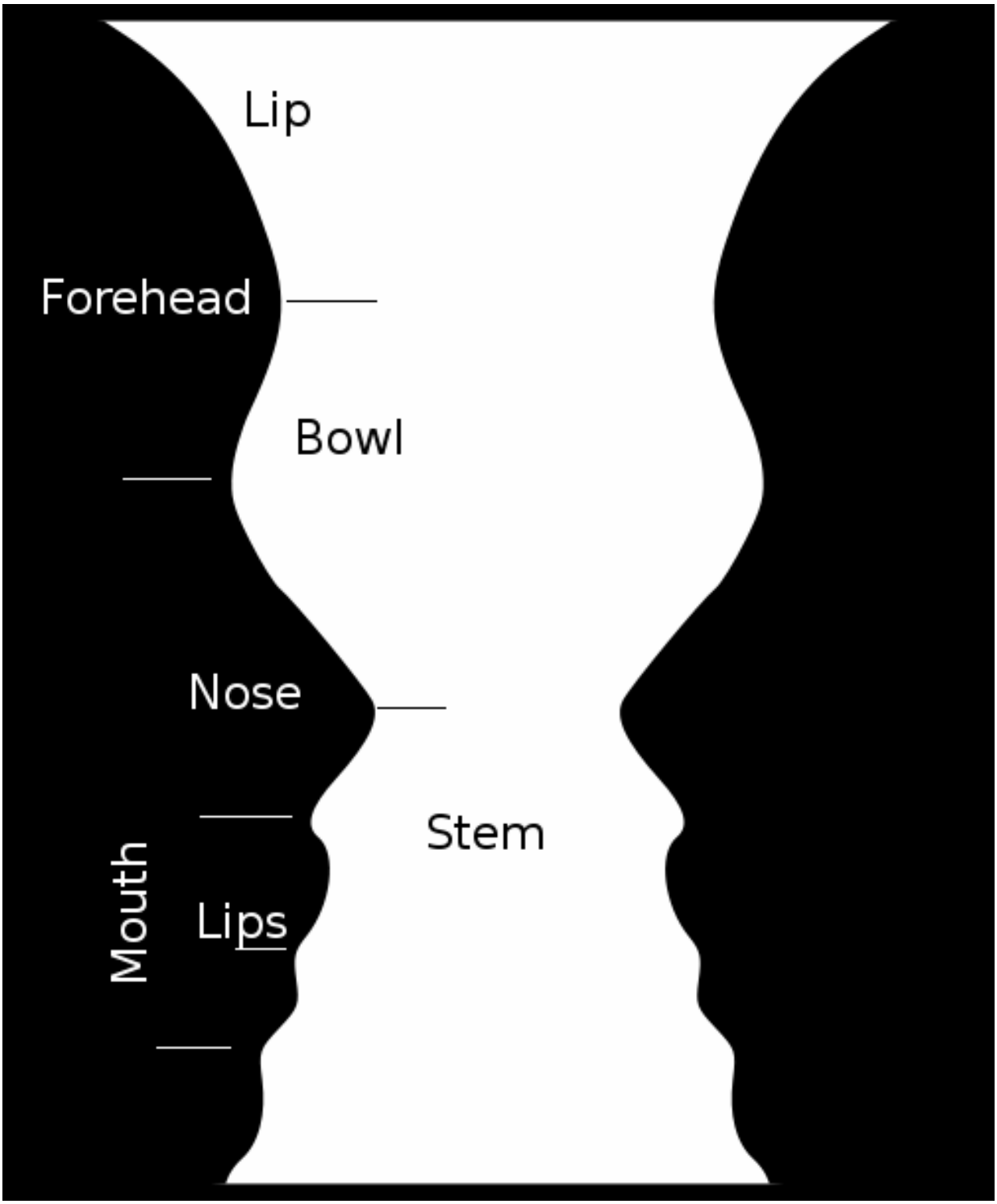
- Within 2-3 weeks of the training, email participants:
    - *Thank you for your participation in the recent Click2Science training on "Reflecting and Processing STEM Experiences". I hope you found it useful. I am attaching the funnel and sand investigation for you to use with your youth. Consider meeting 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

Silhouette Activity

These images can be pasted into a powerpoint slide. Image from Wikimedia Commons; edits by Click2Science.





Transcript: Making Meaning from STEM Learning

[1:37] Group reflection through "plussing" begins

Staff: So what is adding an egg and another army guy gonna do to your contraption?
Youth: Pulling down
Staff: Pulling down. So what made you want to change it what did you notice about yours?
Youth: Um, I noticed that when you open it it stays open and when you close it it stays closed. That's one thing it does. And the other army guy just adds more weight to it.
Staff: Adds more weight to it. So you've created more drag. And what did you say? It catches the air?
Youth: Yeah it's kinda like a parachute.
Staff: Yeah just like a parachute basically
[2:05]
Youth: I added this to make it have more gravity sort of.
Staff: So why did that not work
Youth: Cuz it didn't even fly.
Tania: and I did do this and I had the army man on top inside with the parachute on top and that still didn't work because it was too heavy still and the thing so it'll just go down.
Staff: Does anyone have a plus for Tania? What could she have done to this design to get it to hover more?
Youth: Maybe make it farther from the actual cup?
Staff: Make it farther from the cup? What do you think that would have done?
Youth: Made it float.
Staff: Made it float more.

Funnel & Sand Investigation

Materials

Small tub
Two Funnels (1) small (1) large
Plastic tubing (at least 12 inches and diameter should fit well with the funnels)
Fine Sand

Instructions

- Generate a list of questions about the materials with learners. Decide on one question to explore. (Ex. What will happen when you fill the funnel with sand?)
- Record predictions using a journal or scratch paper.
- Fill the tub at least half-full of sand.
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    a. What happened when the funnel was filled with sand
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    c. Were these things different or the same as others in your group:
        i. Prediction
        ii. Ways you manipulated the materials
        iii. Ideas about what happened and why
        iv. What would your group do next? (What materials, research, resources, etc. would they want to understand)

Self-Reflection: Reflecting and Processing STEM Experiences

Think about how often you do the following reflective activities with youth in your program. Use the rating scale below to choose responses to each statement.

1=never tried it 2=not usually 3=sometimes 4=most activities 5= every activity

1 2 3 4 5 I reflect on the activities we've done in our program to try to improve.

1 2 3 4 5 I ask questions like, "How can you explain what happened?" to help learners make meaning of their experiences.

1 2 3 4 5 I help learners connect our STEM experiences to real-life phenomena.

1 2 3 4 5 I ask guiding questions during investigations to help learners make sense of what's happening.

1 2 3 4 5 I encourage learners to reflect on what they have learned at the end of each activity.

1 2 3 4 5 I ask learners what they would try next.

1 2 3 4 5 I meet with learners to help them plan next steps.

1 2 3 4 5 I provide time for individual reflection.

1 2 3 4 5 I provide time for group reflection.

1 2 3 4 5 I ask questions to connect learners to other activities we've done.

1 2 3 4 5 I encourage youth to write about their STEM learning experiences.

1 2 3 4 5 I help learners build on their own knowledge in meaningful ways.

1 2 3 4 5 I am confident guiding group discussions in which youth explain their learning.

1 2 3 4 5 I reflect on my own understanding of STEM with other staff.

SMART Goals Action Plan

NAME: _____

DATE: _____

Concept/Problem Statement:

_____

_____

Goal Statement:

_____

_____

Specific: What specific action will you take?

_____

_____

Measurable: How will you measure the results?

_____

_____

Attainable: What will be different?

_____

_____

Relevant: The goal relates to this skill and what you do in your program

_____

_____

Timeframe: The goal can be accomplished this month

_____

_____