Professional Development Situation: Meeting

Skill Focus: Supporting Documentation of STEM Learning

Time Required: 30 minutes

DEVELOPING YOUR BEST STRATEGIES

Participants choose the best of three documentation strategies for supporting the paperclip airplanes activity.

Agenda

Hands-On Learning—20 minutes

- Paper Airplanes Activity

Conclusions—10 minutes

Materials

- Airplane Folding Instructions and Paper Outline
- Box of paper clips
- Paper
- Pencils, markers, or pens
- Measuring tape
- One copy for each participant of
  - Tally Chart for Paper Airplanes Activity
  - STEM Paper Airplanes Activity
  - Table for Airplane Activity
  - Types of Documentation to Use with Youth

Before the Session

- **Read this meeting guide** to become familiar with the content and allow time to personalize the activities to best suit your presentation style. Watch all video and read information materials.

  - *Italics indicate text that can be read aloud or emailed to participants.*
- Send reminder email about the meeting. 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 "Supporting Documentation of 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 session.
- Develop a list of possible questions participants might have during the meeting. Create potential responses to be explored through informal conversation. Review any key terms or ideas that may be unclear.

Session Outline

Hands-On Learning (20 min)

- Remind participants that the goal of the meeting is to help everyone understand and implement strategies for documenting STEM experiences in their settings.
- Hand out the Airplane Folding Instructions and Paper with Outlines for folding the airplane.
- Divide participants into groups of 3-5. Give each group a box of paperclips and measuring tape. Pass out Tally Chart for Paper Airplanes Activity, STEM Paper Airplanes Activity, and Table for Airplane Activity handout one of each to each group.
- Instruct participants:
  - *You are a team aeronautical engineers and scientists who are tasked with finding a way to transport supplies 40,000 miles without refueling. In order to design this new piece of aeronautical equipment you must first build a paper airplane that will travel the greatest distance. Teams can use the template to fold the paper airplane or create their own design and use the paper clips to test out how additional weight influences distance.*
- Groups will conduct tests to see how additional weight influences the distance the paper airplane will fly.
  - *Your team will create a paper airplane, test the airplane, and measure the distance it flew.*

- Teams should then modify their design using paperclips. They can attach the paperclips to different parts of the airplane and record the distance their airplane flew with the addition of each paperclip.
- Participants should first make a prediction about what they think will happen. Then, each team will select a documentation sheet that uses a different documentation strategy to record their data.
    - *Make a prediction about what you think will happen when you add each additional paperclip. Before testing your modifications, choose a type of documentation sheet to record your flights on. You may use either the Tally Chart for Paper Airplanes Activity, STEM Paper Airplanes Activity, or the Table for Airplane activity.*
- Participants will then test their paper airplanes, recording the data collected from each test using the measuring tape and recording it on their data sheets.
- Following the tests, each team will share their findings and the documentation sheet that they used to record their data.

Conclusion (10 min)

- As a group, compare the documentation strategies.
    - *Which documentation strategy was the best for comparing how far the airplanes flew with additional weight that was added?* (The scatterplot was the best method for measuring this, as it allowed us to compare how far the airplane flew in comparison with the number of paperclips added.)
    - *Why is it important to give youth the proper documentation strategy for STEM activities?* (The tools you provide them to document the data they collect will shape what they learn; easier to analyze the data and make appropriate conclusions and explanations based on the evidence; helps you assess what they have learned and guide the next learning experience)
- Pass out Types of Documentation to Use with Youth handout. This handout will help participants think about the uses of different methods for documenting results and help them choose the appropriate strategy for each activity. Encourage them to use the handout to guide their future activities with youth.

After the Session

- Email the participants:
    - *Thank you for your participation in the recent Click2Science training on "Supporting Documentation of STEM Learning". I hope you found it useful and applicable to your practice. Consider sharing your thoughts with a co-worker,*

supervisor, or friend. Please let me know if you have any questions. You can reach me 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

Tally Chart for Paper Airplanes Activity

Mark a tally for each time your airplane flies the specific number of feet. Mark a tally for the number of paperclips. Add up the tallies for a total number of times your airplane flew each length and the total number of paperclips you used.

1 ft.	2 ft.	3 ft.	4 ft.	5ft.	6ft.	7ft.
Total	Total	Total	Total	Total	Total	Total

0 Paperclips	1 Paperclip	2 Paperclips	3 Paperclips	4 Paperclips	5 Paperclips
Total	Total	Total	Total	Total	Total

STEM Paper Airplanes Activity

Use this table to tally how far paper airplanes go when they have the number of included paper clips.

Number of Clips added for weight								
4 clips								
3 clips								
2 clips								
1 clip								
0 clips								
	1	2	3	4	5	6	7	
Distance Airplane Traveled (in complete feet)								

Table for Airplane Activity

Trial	# Paperclips	Distance
1		
2		
3		
4		
5		
6		
7		
8		

Types of Documentation to Use with Youth

The way information is recorded and shared should be determined based on what type of documentation will best express the experience.

The 'raw data' can be recorded using tally marks, bulleted points, or just writing down notes. The raw data can then be put into a format (chart, graph, and diagram) to reflect and analyze the information. Through reflecting and analyzing information, conclusions about the experiment/experience can be made and shared with others.

Type	Uses
Venn Diagram	To compare the characteristics of two things. To show the similarities and differences between two things. To show the logical relationship between two things.
Scatter Plot	To compare two variables and their effect on a phenomenon. Example: how speed is affected by weight when testing a model car.
Line Graph	To show changes over time (or experiments).
Bar Graph	To show differences between two or more variables.
Pie Chart	To show proportion (how much of something takes up the whole of it).
Tallies	To record a unit of information (how many times something happens).

As you plan to have youth document their learning, think about:

- What things should be recorded/documented about the experiment/experience?
- How should the information be recorded/documented?
- What tools are needed to record/document the experiment/experience?
- Should the information be shared with others? If so, who and how?

Resources: Supporting Documentation for STEM

Ashbrook, P. (2010). Documenting learning. *Science & Children*, *48* (3), p. 24.

Kroeger, J. (2006). Documentation: A hard place to reach. *Early Childhood Education Journal*, *33* (6), pp. 389-398.

Bers, M. U. & Portsmore, M. (2005). Teaching partnerships: Early childhood and Engineering students teaching Math and Science through robotics. *Journal of Science Education and Technology, 14* (1), pp. 59-73.

Benenson, G. (2001). The unrealized potential of everyday technology as a context for learning. *Journal of Research in Science Teaching*, *38* (7), pp. 730-735.

McGinn, M. K., & Roth, Wolff-Michael, R. (1999). Preparing students for competent scientific practice: Implications of recent research in Science and Technology. *Educational Researcher*, *28* (3), pp. 14-24.

Forman, George. (1986) Observations of young children solving problems with computers and robots. *Journal of Research in Childhood Education*, *1* (2) pp. 60-74.

Websites

http://www.citytechnology.org/kids
Use Educator's link for simple experiments.

http://www.sciencekids.co.nz
Wide variety of Science related experiments, lessons, images, and videos.