Module 5:
Feedback to Support Argumentation

July 1, 2016

Module Goals:

- Develop a deeper understanding of argumentation and its potential in the math classroom.
- Further develop strategies to support students in generating, extending and sharing their arguments (and understanding) as a discussion unfolds.
- Analyze student verbal and written mathematical arguments, using the structure of an argument, in order to provide feedback (feed*forward*) to support mathematical argumentation.

Argument is the soul of an education

Schmoker & Graff (2011)

The Salary Problem!
Bad News-Good News

Bad news! You get a pay cut of 10%. (And for quite some time, your pay doesn't change.)

Your boss comes to you one day. "Good news! I've been fighting for a raise for you and I got you a 10% raise! You're back to your old salary."

Is your boss right? Show how you know.
Try to show it in as many different ways as you can.

Number Trick Task

Jessie discovers a cool number trick. She thinks of a number between 1 and 10, she adds 4 to the number, doubles the result, and then she writes this answer down. She goes back to the number she first thought of, she doubles it, she adds 8 to the result, and then she writes this answer down.

Here is an example:

Jessie thinks of the number.	5
She adds 4 to her number	5 + 4 = 9
She doubles the result	9 x 2 = 18
She writes down her answer.	18

Jessie goes back to the number she thought of.	5
She doubles her number.	5 x 2 = 10
She adds 8 to the result.	10 + 8 = 18
She writes down her answer.	18

Will Jessie's two answers always be equal to each other for any number between 1 and 10? Explain your reasoning.

Does your explanation show that the two answers will always be equal to each other for *any* number (not just numbers between 1 and 10)? Explain your answer.

Student Sample _______ Name:_____________________________

Mathematical Argument

I claim that ____

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I know this is true because ____

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My Math work that supports this is

Name:______________________________

Mathematical Argument

I claim that ____

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I know this is true because ____

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My math work that supports this is

TEAM NAMES: ____

Mathematical Argument

We Claim that ____

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We know this is true because

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Our math work that supports this is

Supporting Argumentation in Action

Role-Play Activity

As a small group, you will work together to act out the roles of *Teacher* and *Students* engaged in a mathematical argumentation activity focused on the Number Trick Task. The purpose of this activity is to provide an opportunity to focus on supporting student argumentation in "real time." The activity will help us consider how teachers can elicit and extend student argumentation, as well as what students might gain from their exchanges.

Before starting the role-play activity, be sure you have worked through the Number Trick Task on your own. You can choose to use the organizer for constructing an argument that you were given if you find it helpful.

ROLE PLAY ACTIVITY

1. ASSIGN ROLES:

The group member who received the **RED** candy bar plays the role of **TEACHER.**
Group members who received other colored candy bars play the role of **STUDENTS**.
Each student will be given a student work sample.

JOB DESCRIPTIONS: Please familiarize yourself with the role you have been assigned.

Teacher:

- Make sense of student thinking using their written work and discussion.
- Focus the discussion between the group of students.
- Your major objective is to support student learning, which may include, clarifying students' thinking and supporting them to extend and elaborate their mathematical arguments.
    - It is okay if the group does not have time to fully get a consensus on their group argument. You're focus is on understanding their thinking and helping them engage with the thinking of others.

Student:

- Closely examine the student work sample you have been given. Try to act out the thinking and persona suggested from your work sample. In the role play, you should *be* the student who wrote that work.
- Complete the organizer for constructing an argument based on the student work sample you have been given. Do your best to fill out each section as you think your student would have.
- During the group discussion time, try your best to think like your student did. If you do not have enough information from the student work to know how your student would respond, you can make an educated guess, or you can say, "I don't know."

2. INDIVIDUAL WORK TIME (5 min)

During this time, the *students* should complete the organizer based on their student work. The *teacher* can review his/her copies of the student work to get a sense of what students might be thinking. The *teacher* can also choose to engage individually with students at this time, as if a teacher circulating the room during individual work time.

3. GROUP DISCUSSION **-** WORKING TOWARDS A CONSENSUS ARGUMENT (10 mins)

The *teacher* facilitates a group conversation among all the students in the group. The teacher asks questions or provides feedback to help students to: (a) clarify their thinking, (b) elaborate, extend, or strengthen their arguments, (c) make connections to other students' arguments.

The *students* act out the thinking of their student from what they learned in the written work. One student records group ideas on the colored team organizer for argumentation.

It's okay if you do not have time to come to a complete consensus on the group argument. The purpose of the activity is more about the process of **engaging in mathematical argumentation.**

4. DEBRIEFING THE ACTIVITY (10 mins)

As a small group, reflect on this activity. Record notes as you discuss the following questions:

1. What kind of feedforward from the teacher (or students) seemed to be productive for group?

2. As the teacher, what were you focused on when formulating your questions or feedback?

3. As a student, what questions, prompts or comments helped you express or develop your ideas?

4. How does this activity apply to your classroom teaching situation?

~~Feedback~~ Feed*forward* to Advance Student Argumentation

Closely examine the sample of student written work. Holistically consider each student's argument. For the student work sample consider the following sets of questions.

<u>Analyzing the Argument</u>

- Identify the argument. What is the claim? What's the evidence the student offers? What's the warrant(s) that links the evidence to the claim?

<u>Critiquing the argument</u>

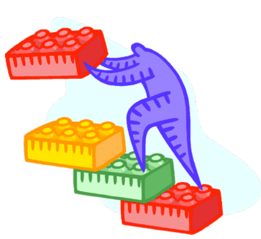
- Is the approach (chain of reasoning) mathematically sound?
- Are there logical gaps? Must the reader fill in connections or pieces of evidence?
- What are the strengths of the student's work sample?

<u>Conceptual understanding</u>

- What can you infer about the student's (developing) understanding of the distributive property?

STARS & STAIRS: Next, based on your analysis of the sample of student work:

a. Identify what the student is doing well with respect to argumentation. Write a ***Stars*** comment that conveys to the student what s/he is doing well.



b. Identify an area of improvement for the student with respect to argumentation. Write a ***Stairs*** comment, that is, a learning promoting comment that conveys to the student how s/he might grow.

You can write directly on the work samples, record thoughts above, or use the back side.

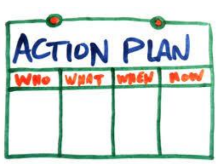
NAME: ____

Next Steps & Reflections

Please answer the following questions based on your experience with the modules of the Bridging Math Practices program. Please submit to the folder when complete.

The TAKE AWAY

If you had to choose ***one idea*** from any of our modules to share with your grade-level colleagues who didn't participate, what would it be?



Think about how this PD fits into your own personal growth as a mathematics teacher. What is **one specific action** you will take this summer/fall to implement your new learning?