

# Conducting a Whole Class Discussion about an Instance of Student Mathematical Thinking

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# *Building on MOSTs: Investigating Productive Use of High-Leverage Student Mathematical Thinking*



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# Teacher Actions that Support Sense-Making

- Prompting students to make sense of an individual student contribution
  - pressing for justification (Drageset, 2014; Ellis et al., 2019)
  - asking probing questions (Webb et al., 2019)
  - requesting that students evaluate the correctness of an idea (Drageset, 2014; Bishop et al., 2016)
  - asking students to reflect on an idea (Ellis et al., 2019)
- Supporting students to make sense of how ideas are related
  - positioning one student contribution relative to another (Webb et al., 2019)
  - requesting that students make connections among two or more contributions (Lineback, 2015; Bishop et al., 2016)
- Keeping students focused on the contribution that they are making sense of
  - putting unrelated ideas aside (Dragset, 2014)
  - redirecting students' attention (Lineback, 2015)

# Coordinated Collection of Teacher Actions

- Conducting a whole-class discussion focused on making sense of a particular student contribution requires a coordinated collection of teacher actions.
- Smith and Stein (2018) articulated one such coordinated collection of actions for *orchestrating a whole-class discussion* around a high-cognitive demand task.
- When a high-leverage student contributions emerges in the moment during a whole-class discussion, a different collection of actions is needed to conduct a discussion around that contribution (Leatham et al., 2021; Van Zoest et al., 2016).

*Building on a MOST*

A MOST is a **M**athematical **O**pportunity in **S**tudent **T**hinking



**Establish**

**Grapple  
Toss**

**Conduct**

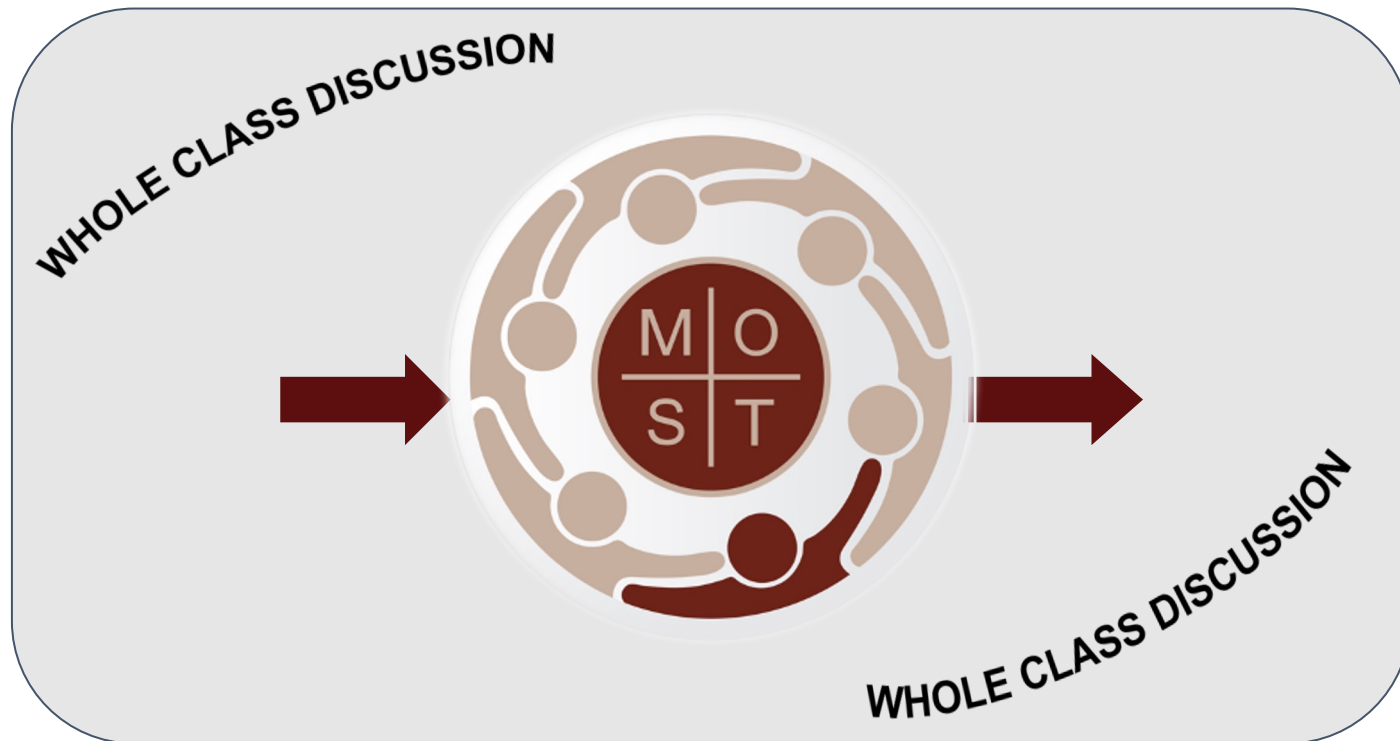
**Make  
Explicit**

**Building on a MOST**

Building on a MOST is engaging the class in making sense of the MOST to better understand the mathematics of the MOST.



# CONVERSATIONAL BUBBLE



Conceptualize  
Building

Share with  
Teacher-  
Researchers

12 practicing  
secondary school  
math teachers

Create  
Instantiations  
of Building

Analyze  
Instantiations

Coded enactments for  
teacher actions that  
either facilitated or  
hindered the overall  
practice of building

- Four mini-tasks to elicit predictable MOSTs
- 49 videorecorded enactments



**Variables**

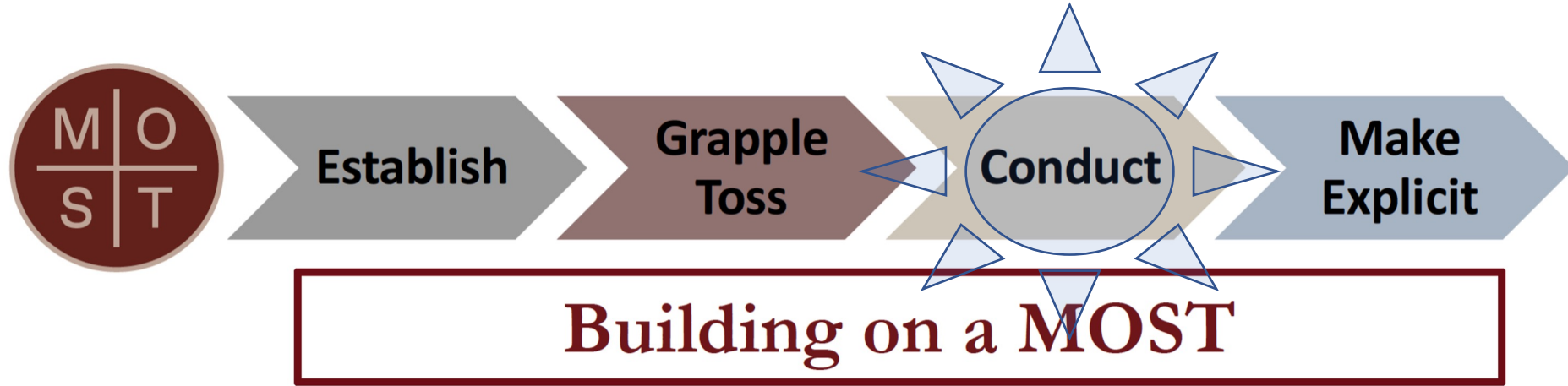
Which is larger,  
 $x$  or  $x + x$ ? Explain your reasoning.

**Bike Ride**

On Blake's morning bike ride, he averaged 3 miles per hour (mph) riding a trail up a hill and 15 mph returning back down that same trail. What was his average speed for his whole ride?



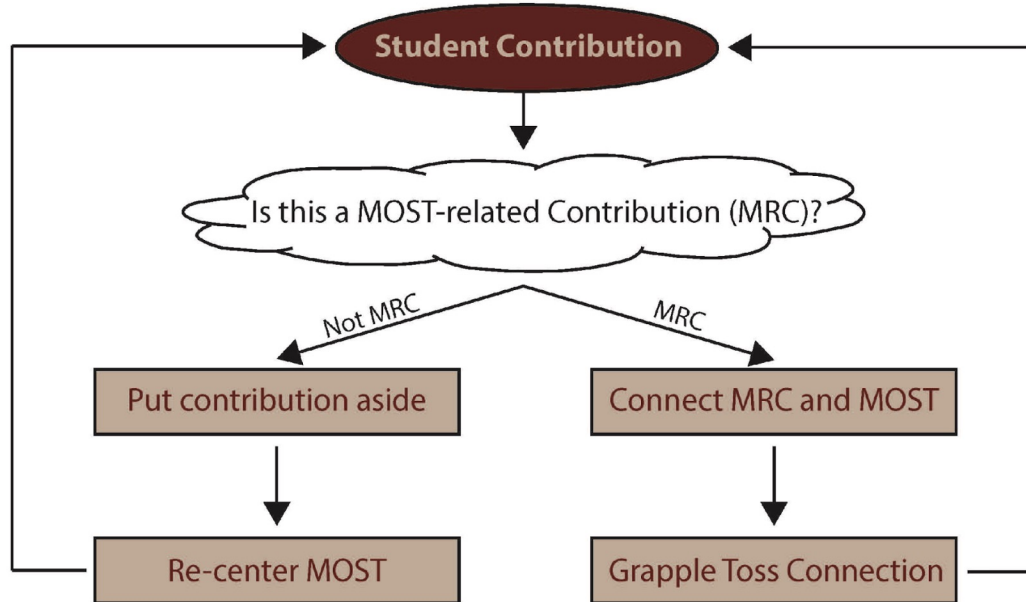
**Goal:** keep the whole-class discussion focused on the MOST as the teacher facilitates the class's movement toward making sense of the mathematics of the MOST



*What are critical aspects of the Conduct element of building as revealed through teachers' attempts to enact the practice?*

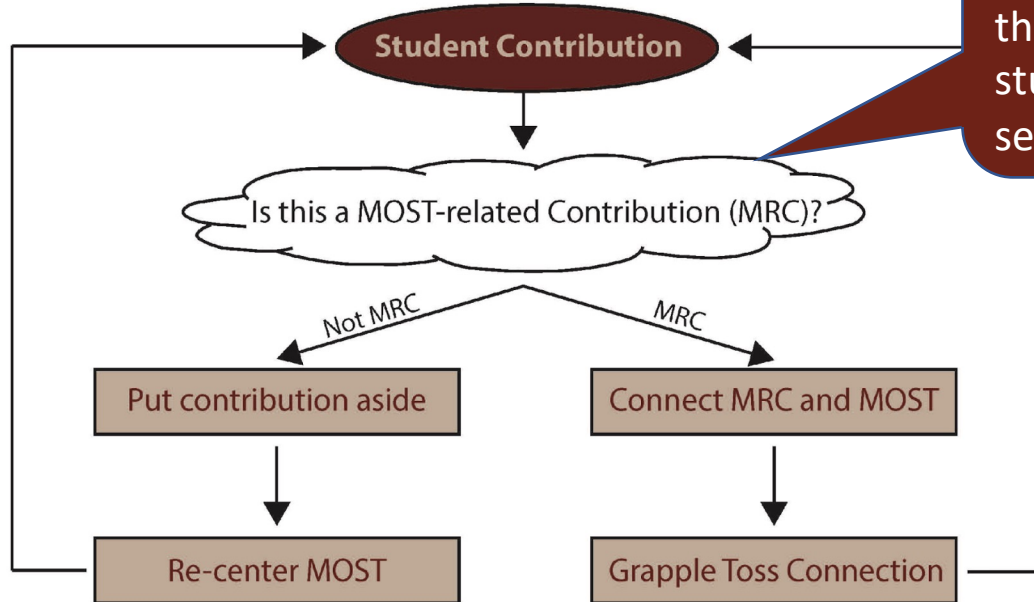


# CONDUCT





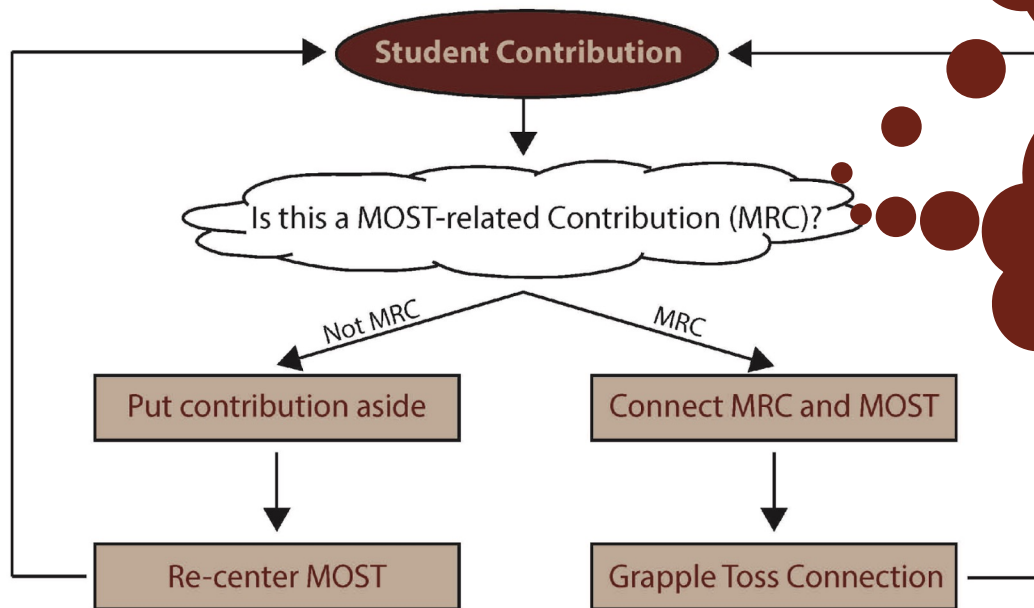
# CONDUCT



MRC: A student contribution that has the potential to help students to make sense of the MOST



# CONDUCT



Is the mathematics of this contribution directly related to the MOST?

Will it help students make sense of the MOST?

# Learning Teaching

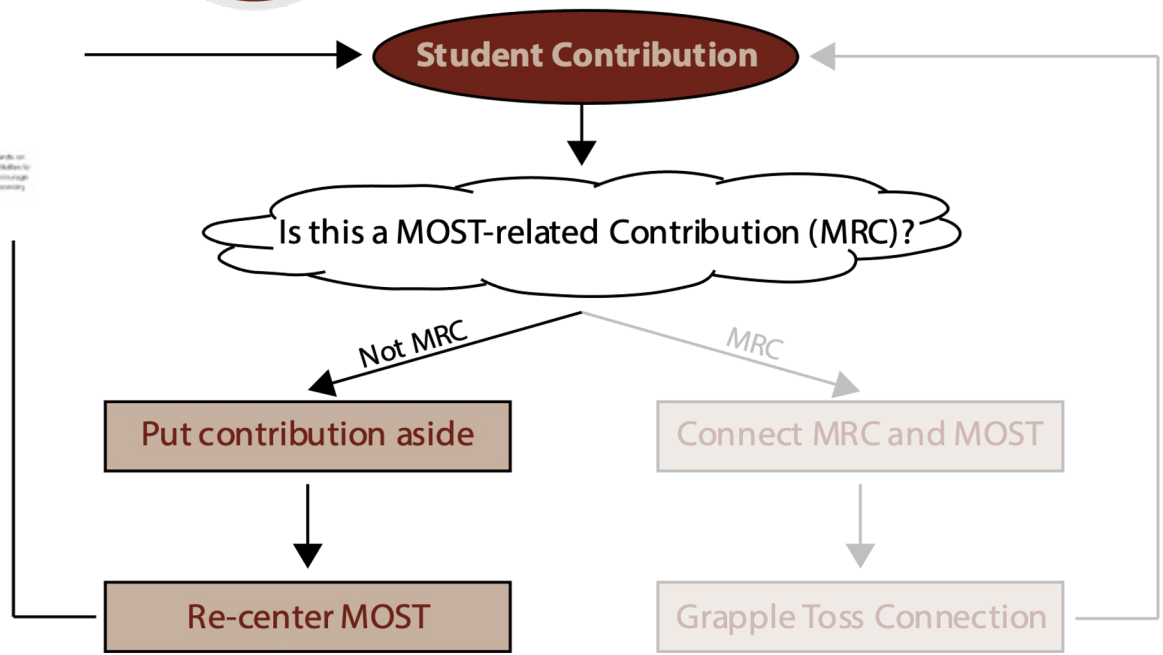


Tackling Tangential Student Contributions

Family Engagement in Support of Mathematics Learning



# CONDUCT





# CONDUCT

**Student Contribution**

Is this a MOST-related Contribution (MRC)?

Not MRC

MRC

Put contribution aside

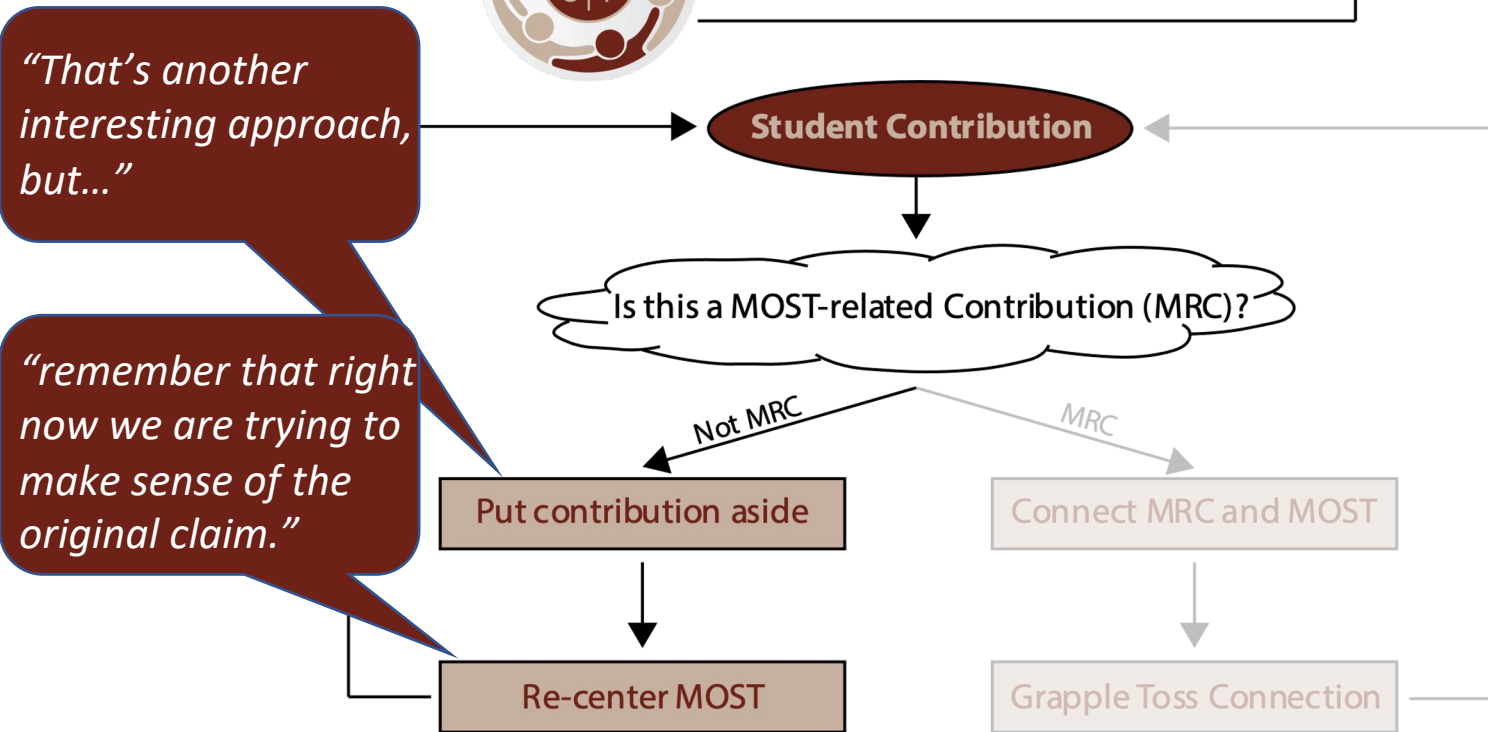
Connect MRC and MOST

Re-center MOST

Grapple Toss Connection

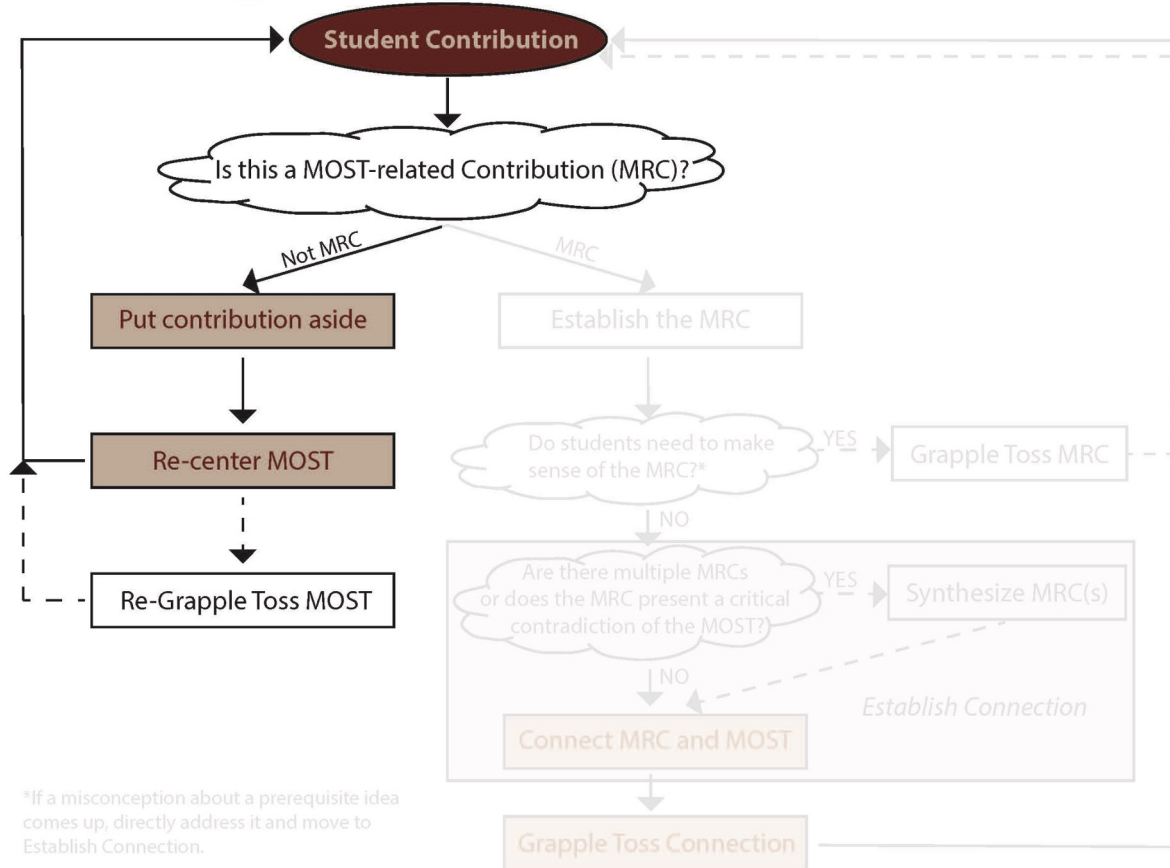
*"That's another interesting approach, but..."*

*"remember that right now we are trying to make sense of the original claim."*



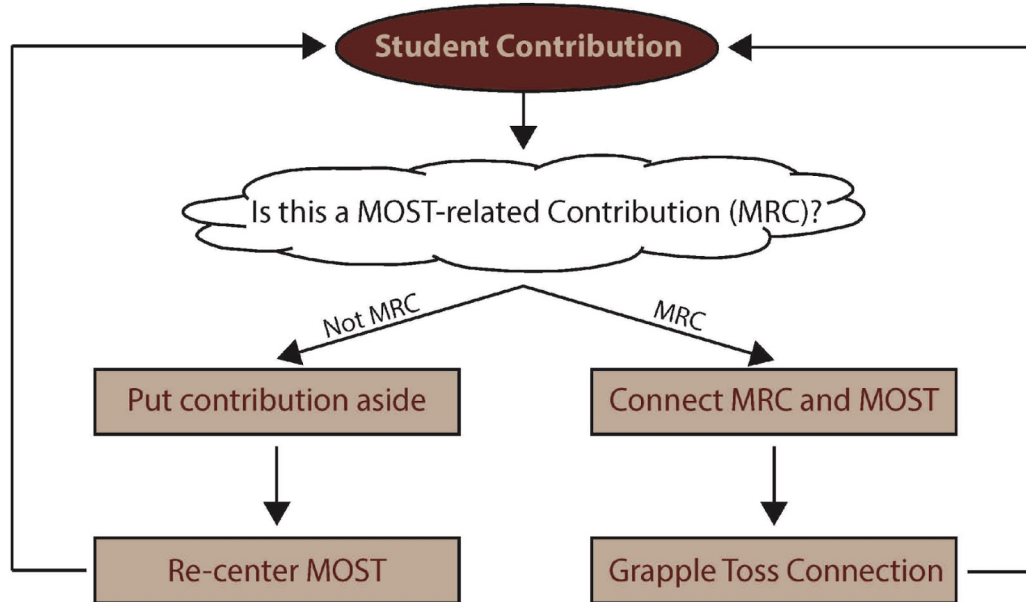


# CONDUCT





# CONDUCT







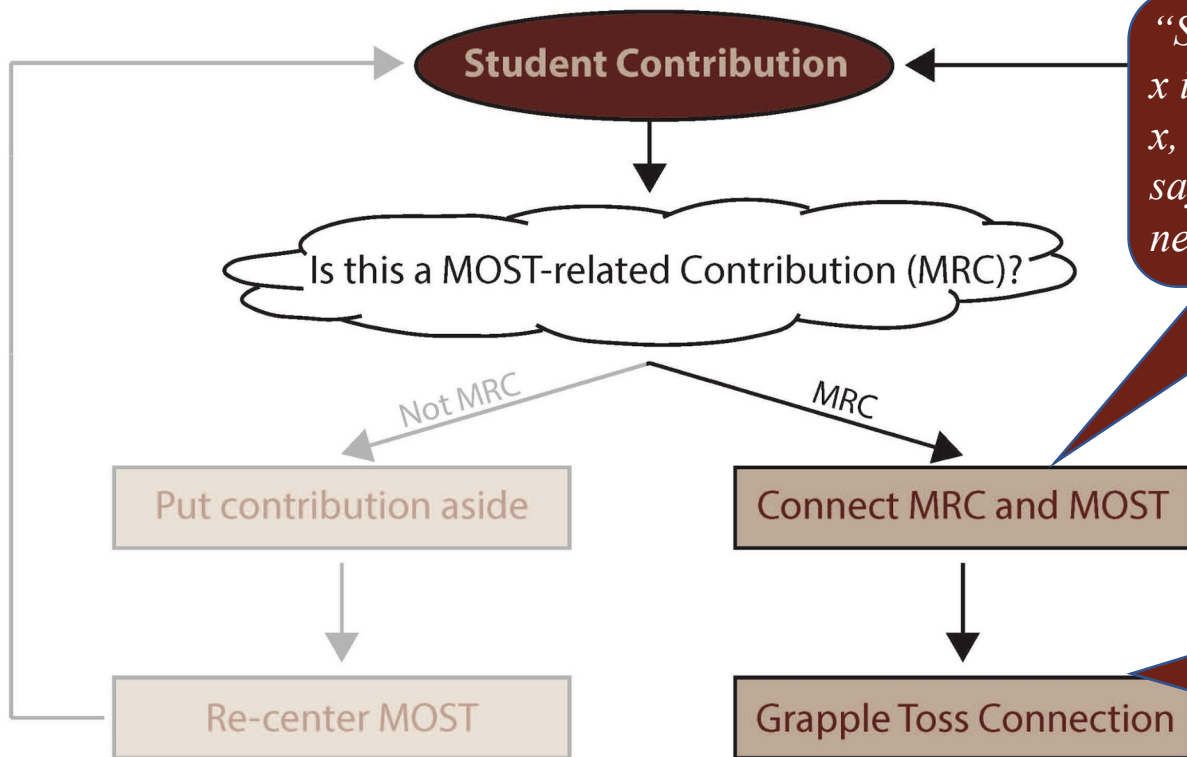
# CONDUCT

OBJECT

*“So Bruce said that  $x + x$  is always larger than  $x$ , but now Jaden is saying that  $x$  might be negative...”*

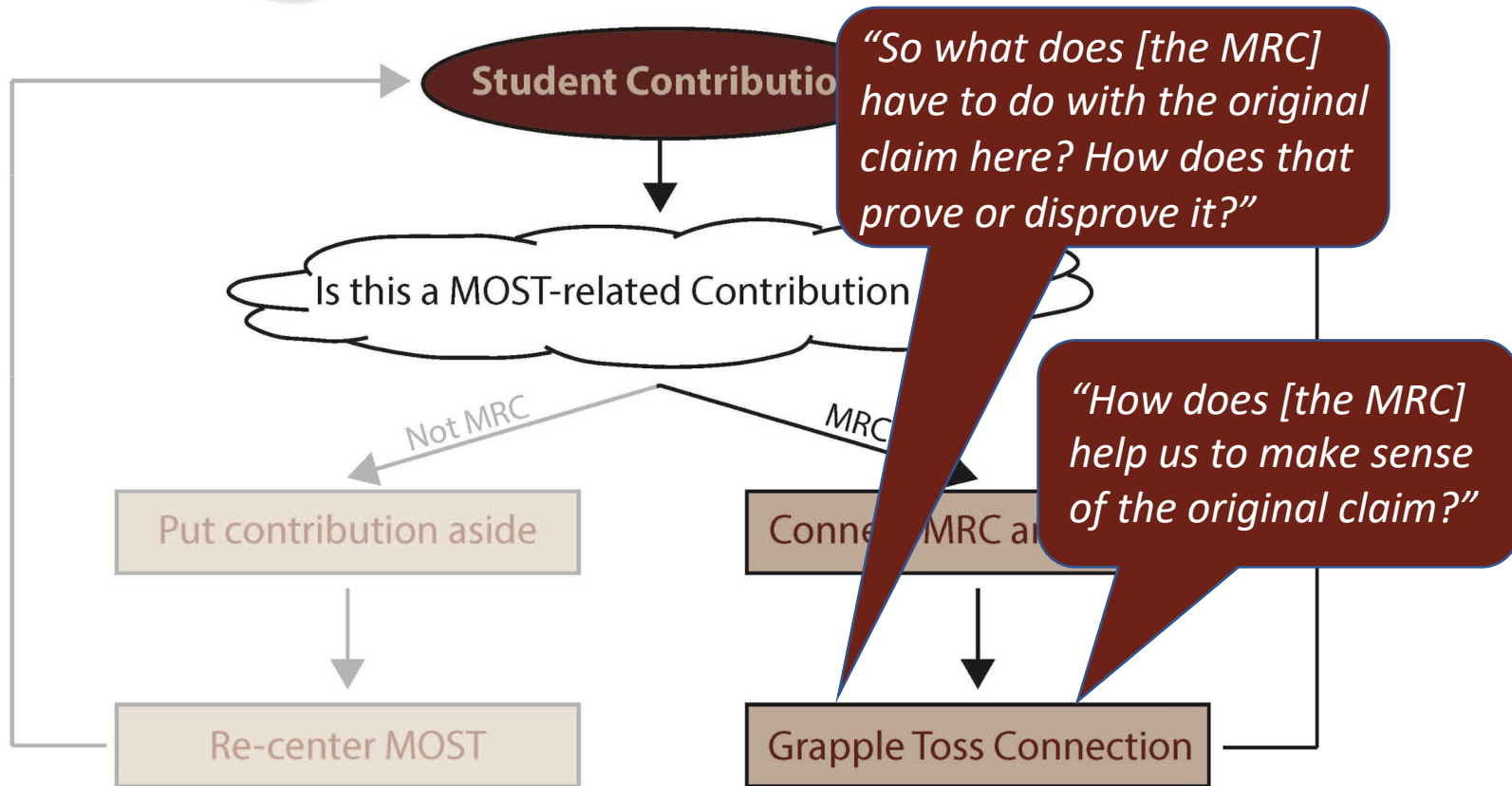
ACTION

*“...how does that relate to Bruce’s claim?”*



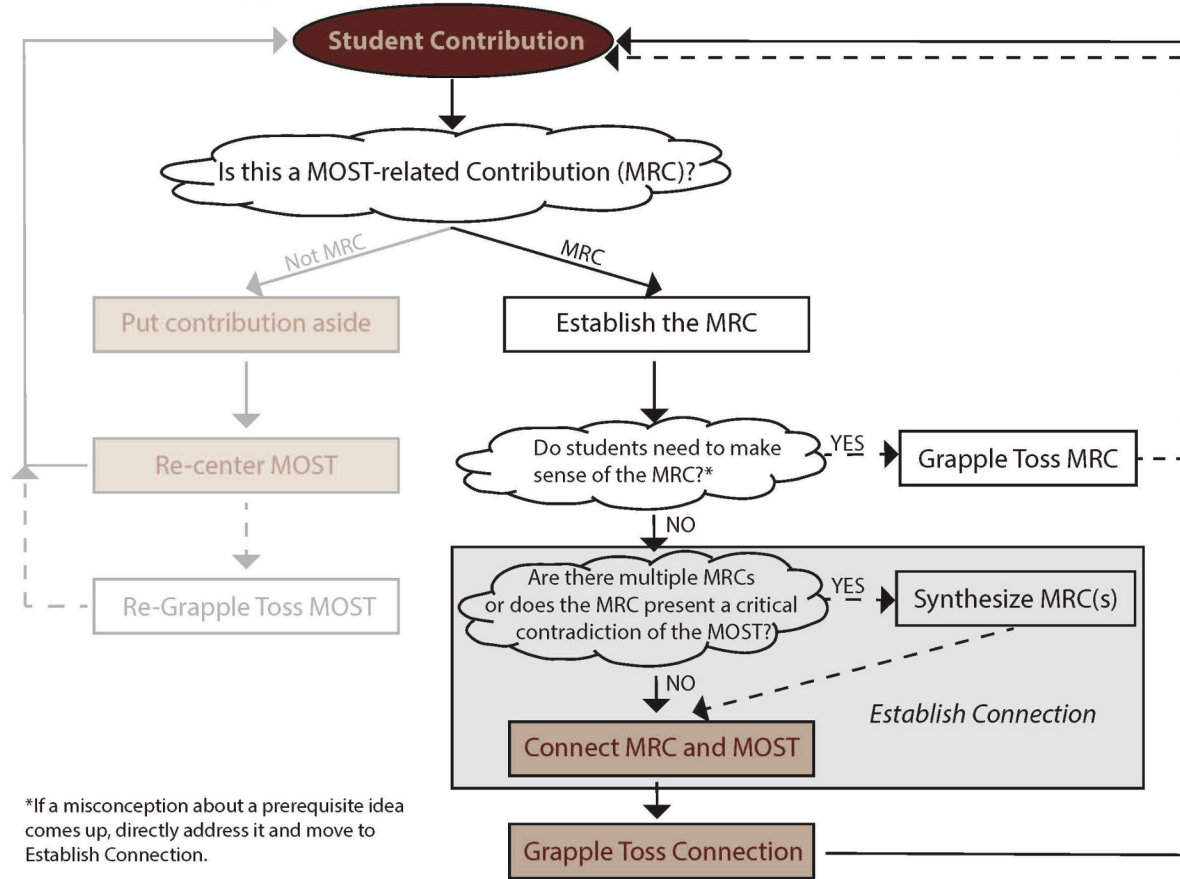


# CONDUCT



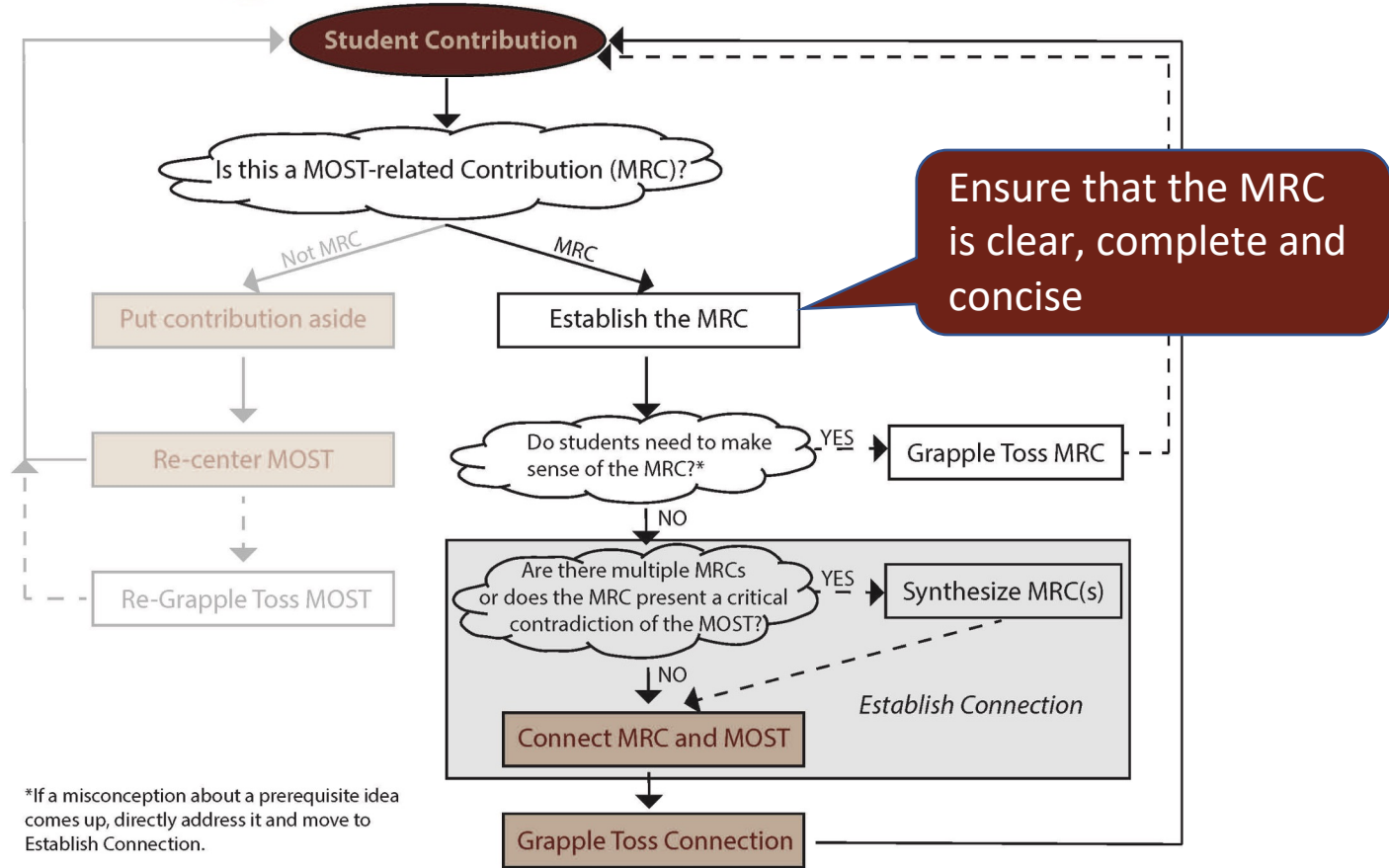


# CONDUCT



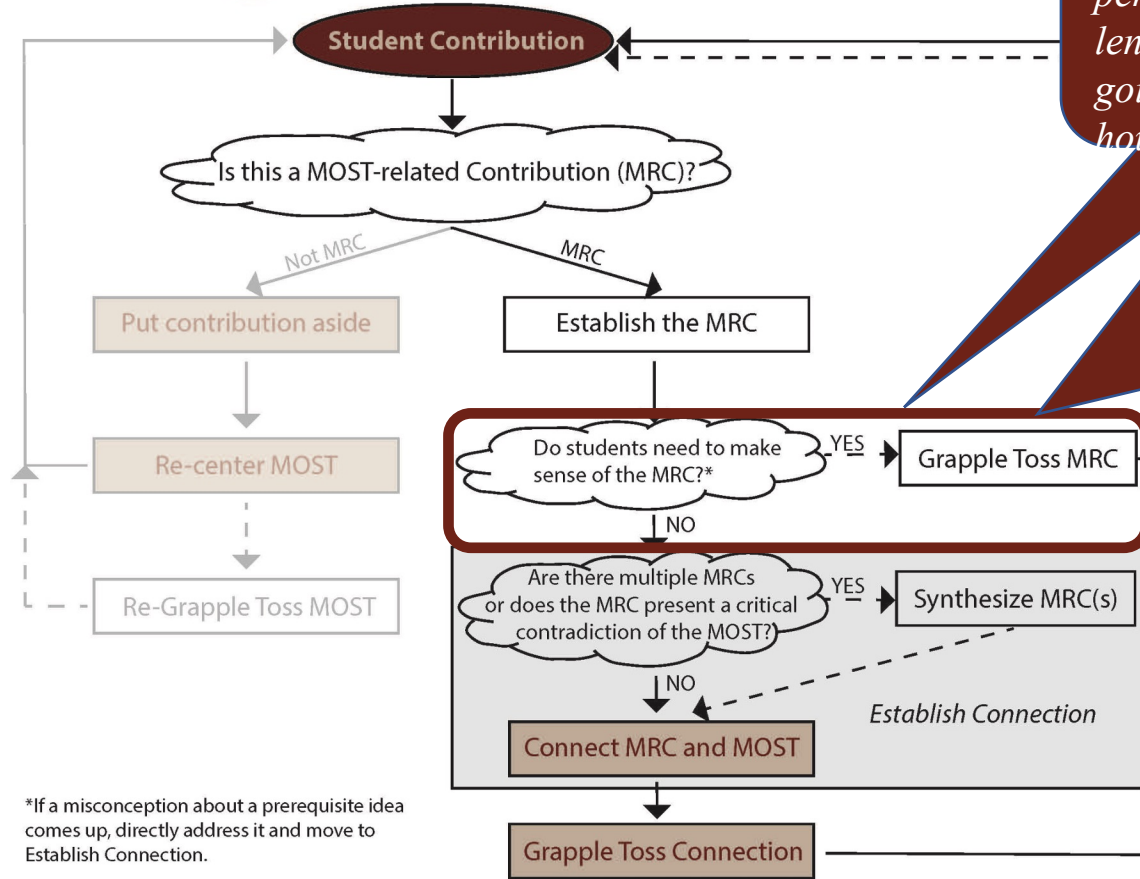


# CONDUCT





# CONDUCT



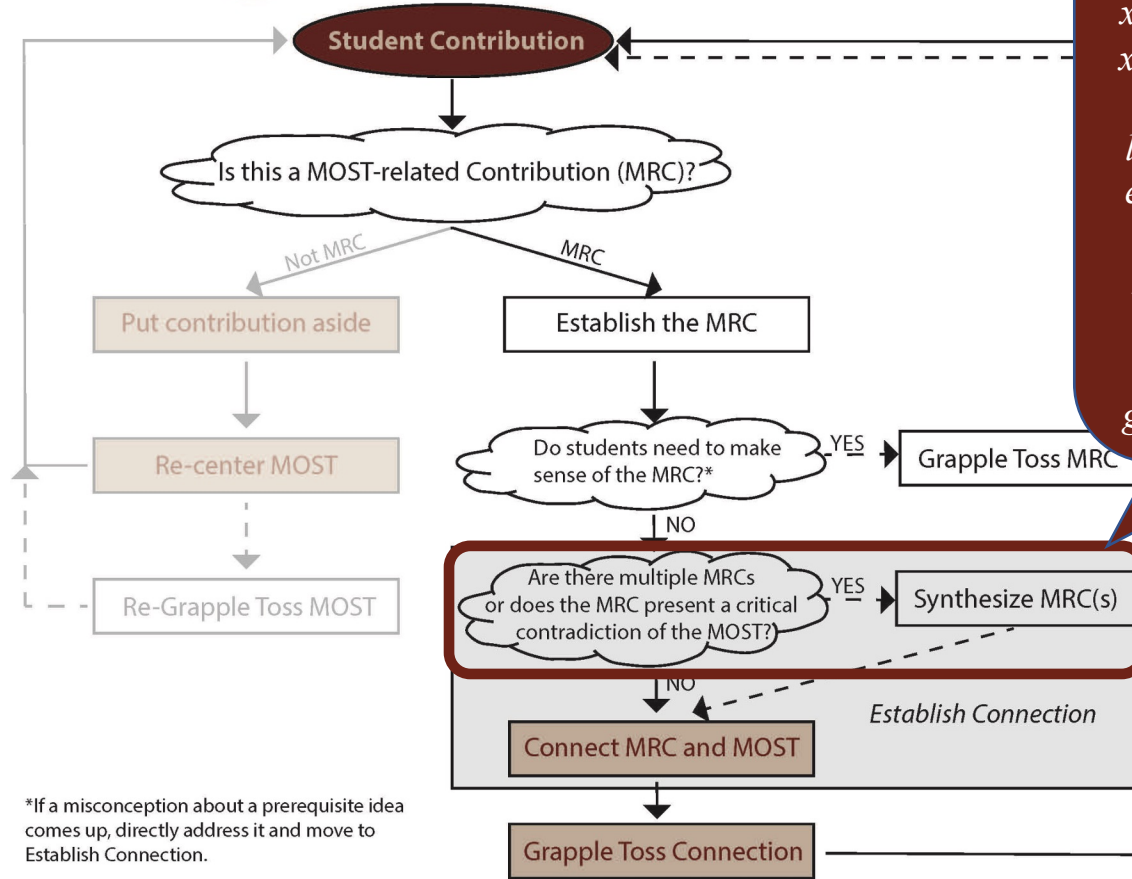
\*If a misconception about a prerequisite idea comes up, directly address it and move to Establish Connection.

Corbin: *"In the problem, Blake's going 3 miles per hour for the same length of time as he's going 15 miles per hour."*

Teacher: *"What do you think about this idea that Blake rode the bike for the same amount of time going 3 miles per hour as 15 miles per hour?"*

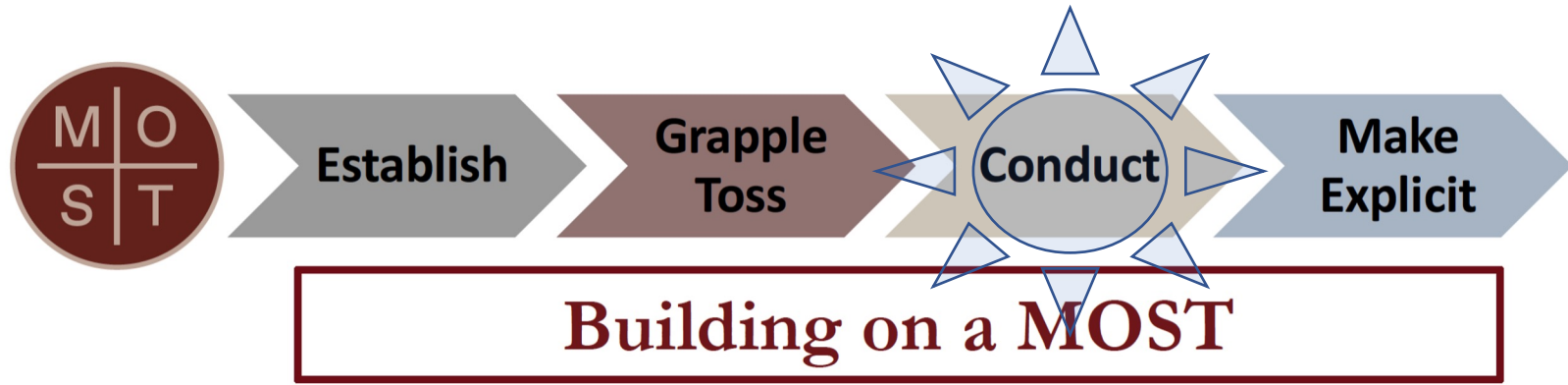


# CONDUCT

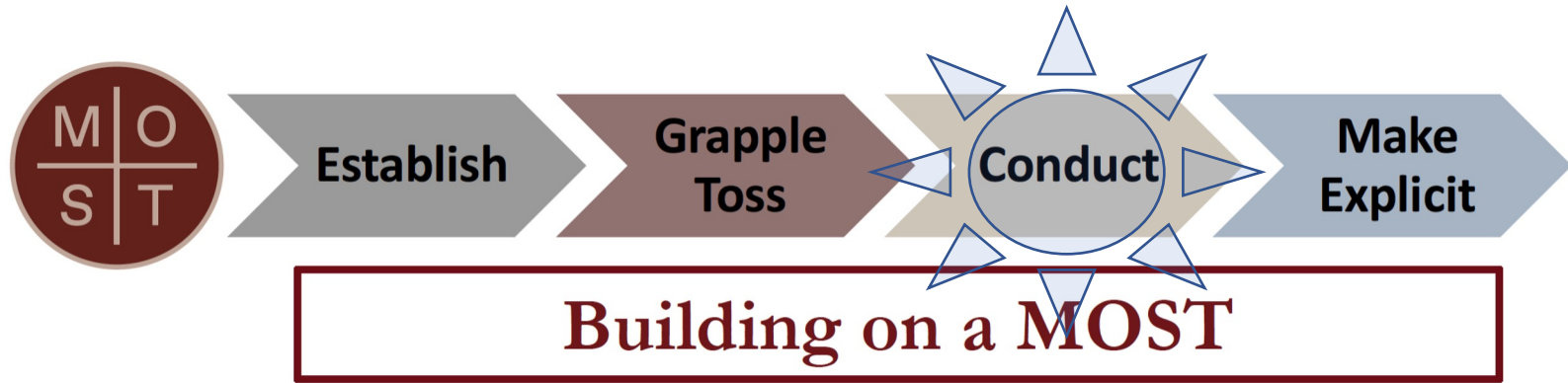


\*If a misconception about a prerequisite idea comes up, directly address it and move to Establish Connection.

*“So here we have Andre’s thinking that  $x + x$  is gonna be larger than  $x$  because  $x + x$  is double so it makes everything larger, right? Somebody else said 5 plus 5, would be greater than just 5, right? And Briana, now you’re saying that if  $x$  were -9, then -9 is greater than -9 plus -9. “*



The Conduct element of building requires *critical decisions* in order to *coordinate a collection of teacher actions to engage students in making sense of a MOST*.



### *Additional Insights about Conduct*

- Important to keep the discussion focused on making sense of the object of discussion, the MOST
- Important to ensure that students have a clear understanding of the object they are to focus on and how they are to engage with that object at any point in a discussion





What are your reactions to this decomposition of conducting a whole class discussion that is focused on making sense of an instance of student thinking?

- How might it be useful for research?
- How might it be useful for working with teachers?

Are there other aspects of joint sense-making in the context of a whole class discussion that this decomposition does not capture?



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# Thank you!

# The MOST Analytic Framework

