

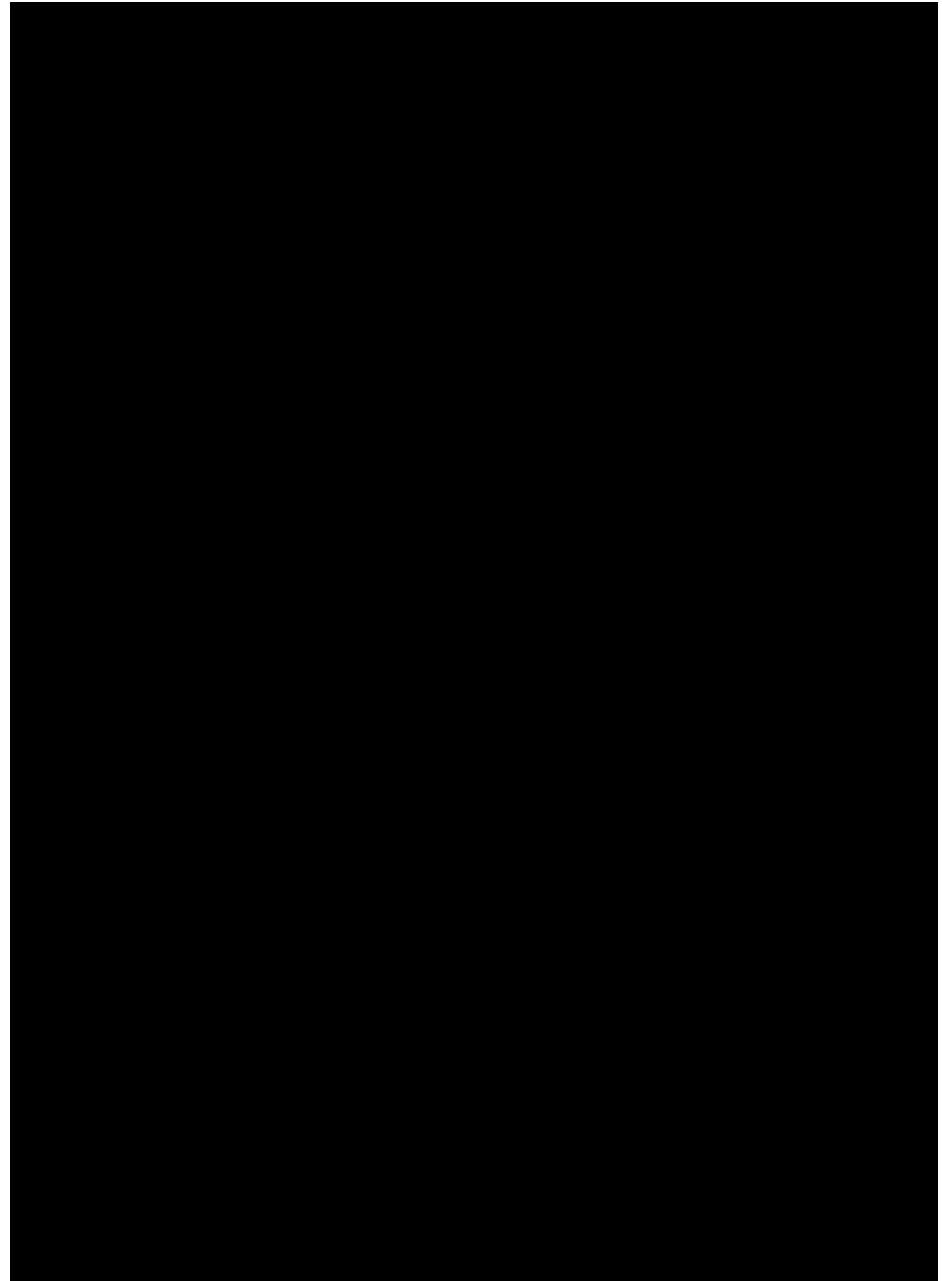
# Fostering Small-Group, Student-to-Student Discourse: Discoveries from a Practitioner Action Research Project

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RME 2015 Conference

# Overview

! Process Standards

! Motivation



# Themes of the RME Conference

- ! Research to Practice
- ! Changing Minds: Supporting Students' Engagement with the Mathematical Process Standards

# Mathematical Process Standards

- ! Students will effectively communicate mathematical ideas, **reasoning**, and their implications using multiple representations such as symbols, diagrams, graphs, and language.
- ! Students will analyze mathematical relationships to connect and communicate mathematical ideas.
- ! Students will display, **explain**, or **justify** mathematical ideas and arguments using precise mathematics language in written or oral communication.

# NCTM and Communication

! The . . . mathematics teacher should strive to establish a communication-rich classroom in which students are encouraged to share their ideas and to seek clarification until they understand. . . . *Explaining, questioning, debating, and sense making* are thus natural and expected behaviors. (NCTM, 2000, p. 271)

# Motivation

- ! **Laura:** The converse, so that's like them flipped around, of the inverse, so it's negative, because the not, and then them flipped around so then it's ... yes. Alright, I got it, I think. ...does that make sense?
- ! **Beth:** That makes sense.
- ! **Kevin:** Yeah, that makes sense.

# Theoretical Framework

- ! Vygotsky

- ! Zone of proximal development (ZPD)

- ! Collaborative ZPD

# Literature Review

- ! Metacognition
- ! Metacognitive training
- ! Need to study teacher intervention
  - ! Brodie (2000)
  - ! Ding, Li, Piccolo, and Kulm (2007)
  - ! Dekker and Elshout-Mohr (2004)

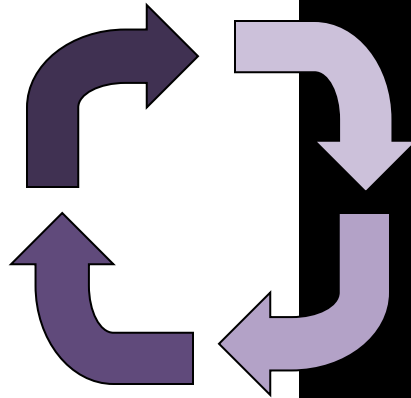


# Research Questions

! What is the nature of the teacher's interactions with the

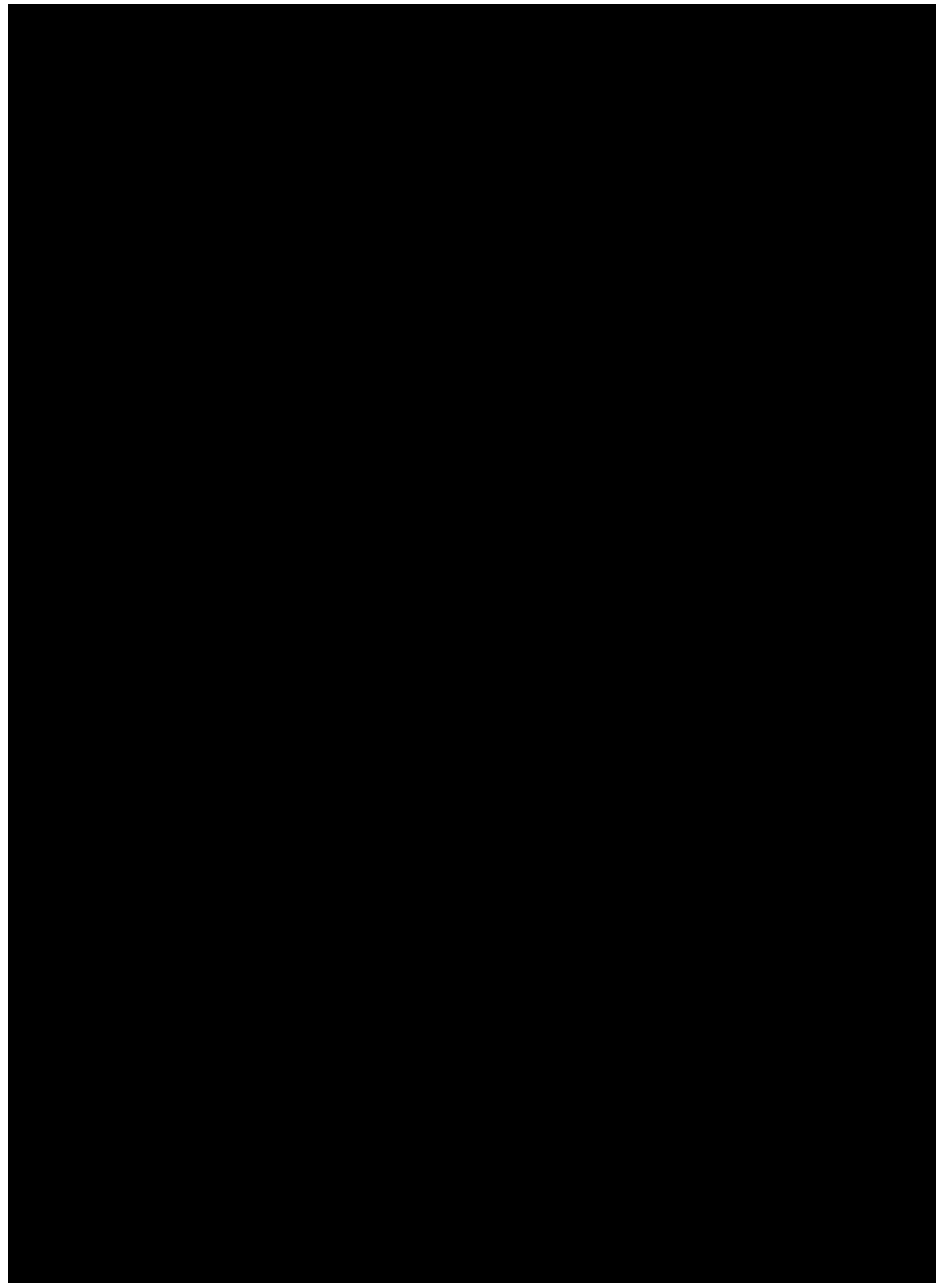
# Action Research

- ! Practitioner Action Research
- ! Deliberate and systematic reflection
- ! Transformation of educational setting
- ! Planning
- ! Acting
- ! Observing
- ! Reflecting

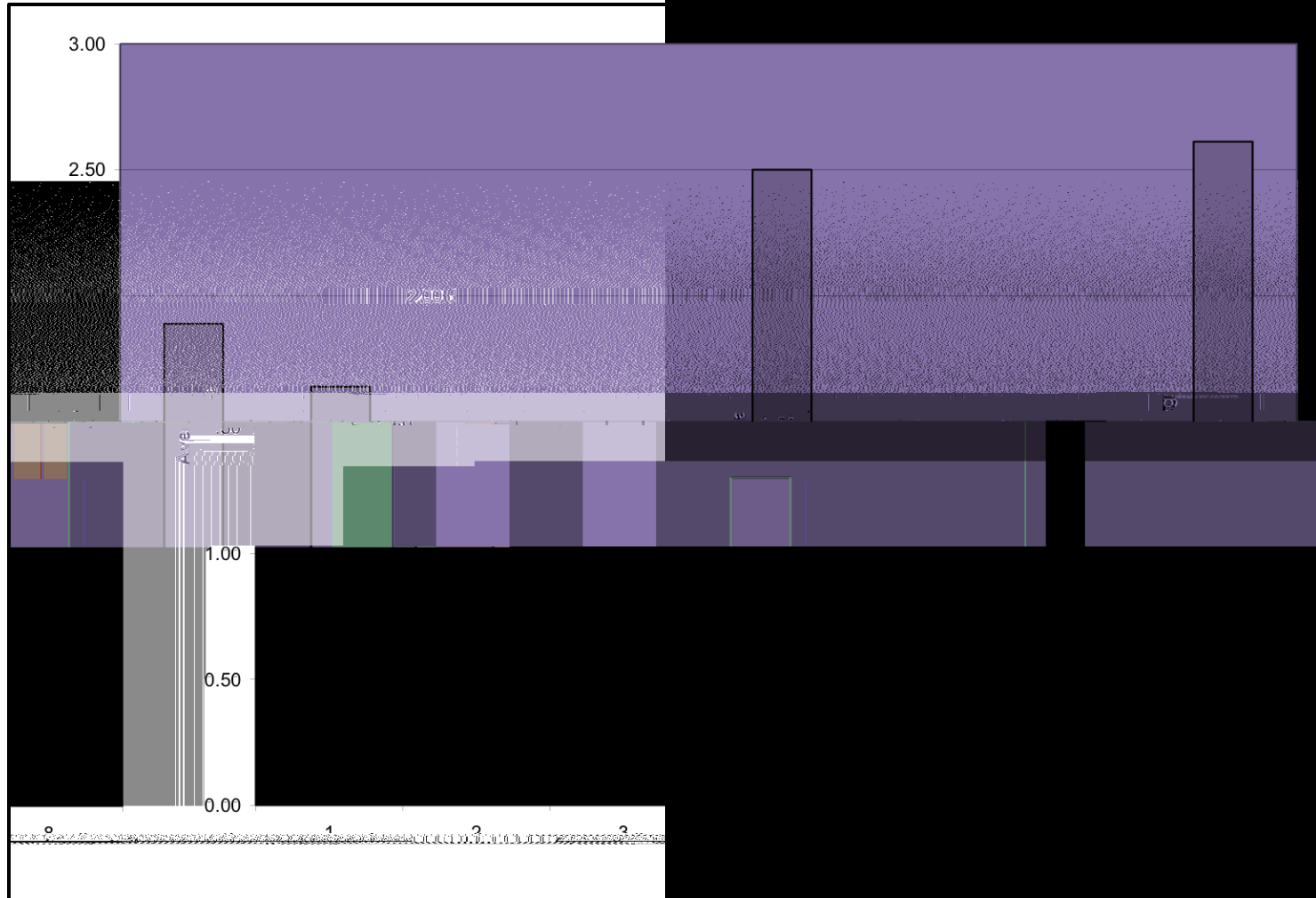


# Process and Data

- ! Beginning (survey)
- ! Research Cycles
  - ! Interventions (audio)
  - ! Whole-class discussions (audio)
  - ! Questionnaires
  - ! Fieldnotes
  - ! Research Journal



# My Students' Communication



# Stage 2: Evaluate Group Communication

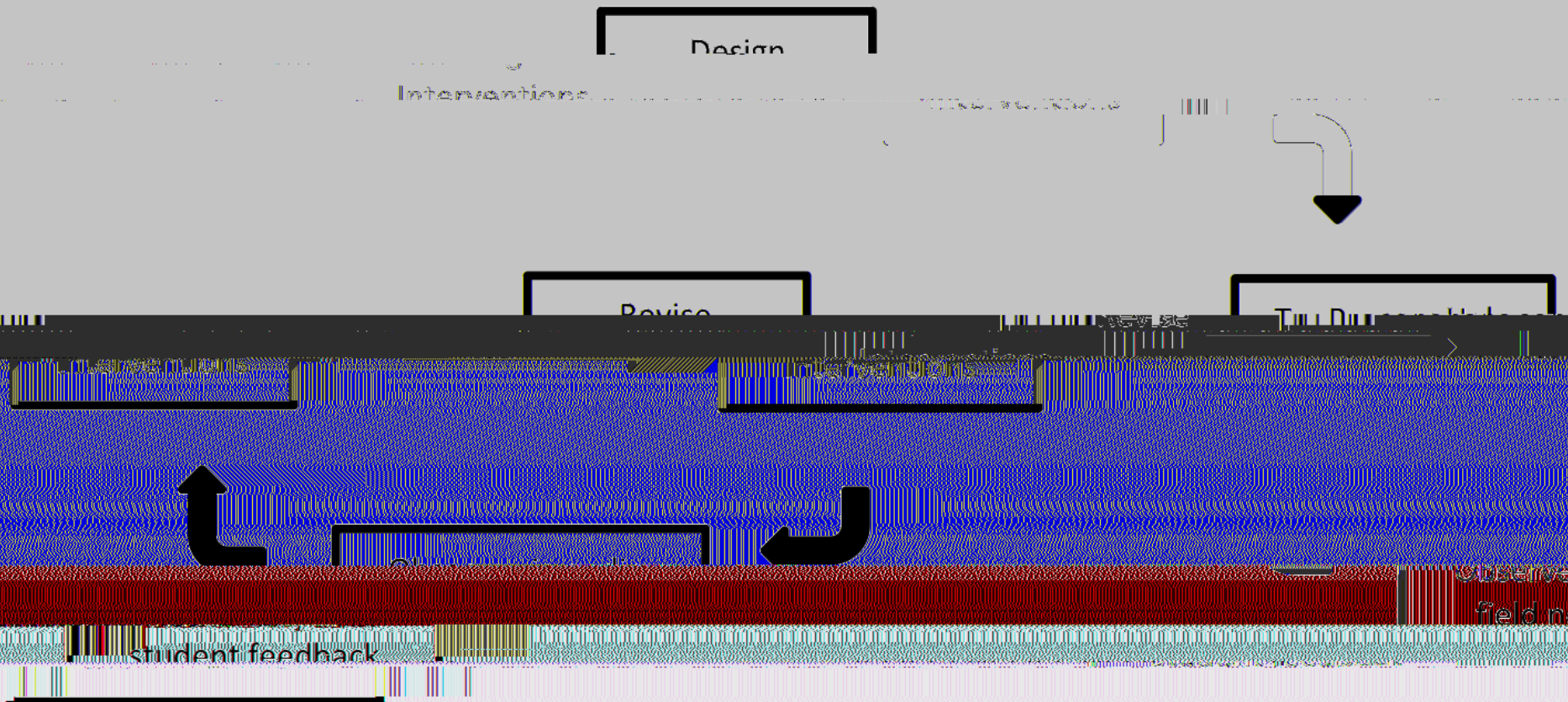
- !
- ! Cannot work without teacher or dominant student
- ! Help/leave/silence
- !

Stage 3:

Evaluate Teacher Communication

Compare and contrast the  
three dialogues.

# Action Research Cycle





# Stage 4: Research Cycles

## Helping Students Communicate

!

- ! What are your questions?
- ! Redirect questions to group
- ! Direct explanations to group members
- ! Refer to other resources

!

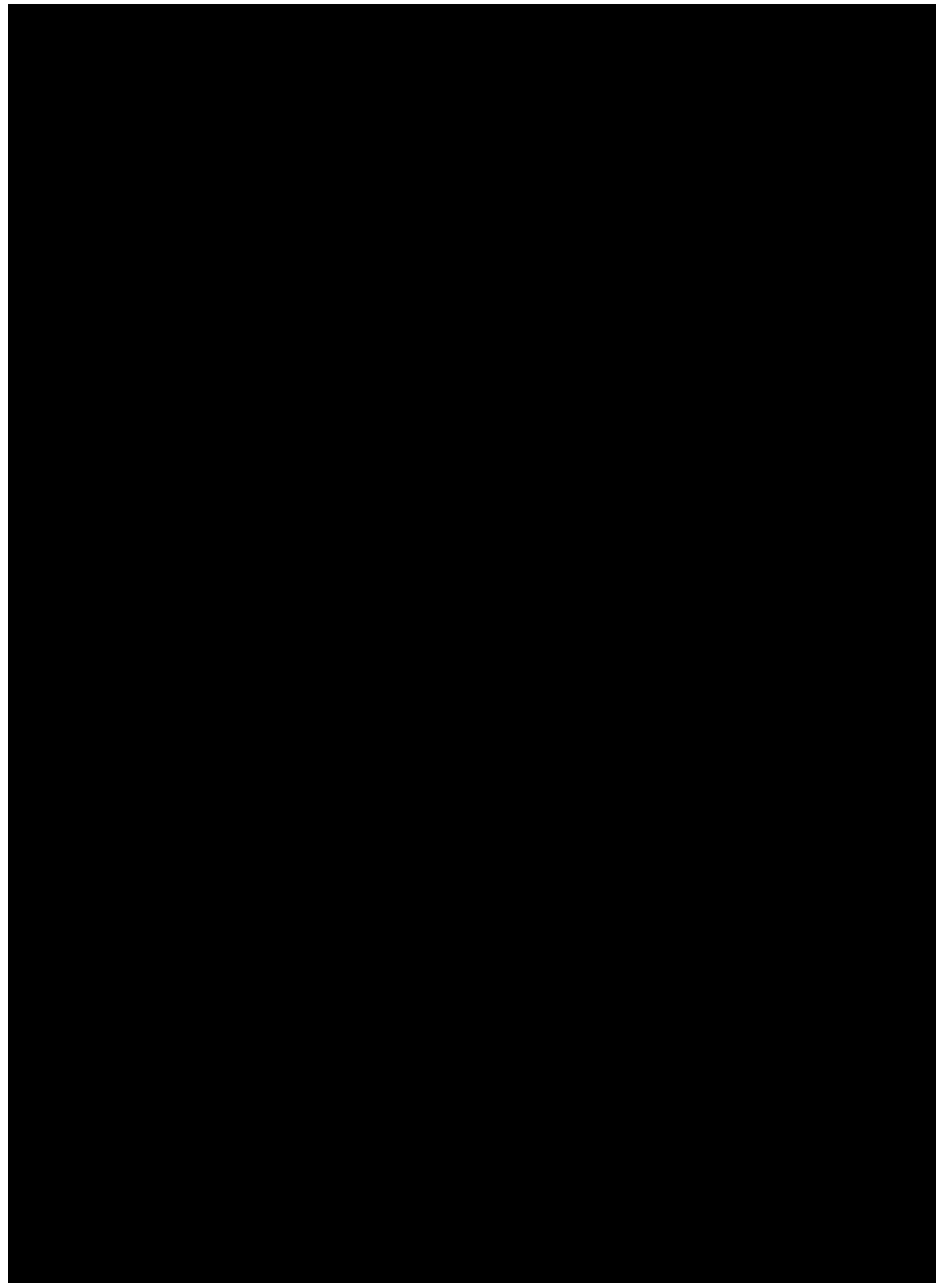
- ! *Leave group with a task*
- ! *Follow-up on progress*

!

- ! *Redirect questions*
- ! Individual work then compare strategies

!

- ! Explain what has been done
- ! *Another student explain*
- ! *Restate in own words*
- ! Answer another student's question



# Stage 4: Research Cycles

## Changing Socio-Cultural Norms

- !
- ! Compare strategies
- ! Evaluate work of others
- !
- ! *Redirect question to group*
- ! *Ask student to redirect question to group*
- ! Explain work to others
- ! Ask others to evaluate work
- !
- ! Restate in own words
- ! Evaluate student's ideas

# Improved Student Communication

- ! **Ellen:** Is it the midpoint of A and C, though, isn't it?
- ! **Laura:** No. Because, look, these two have different measurements. It's not the midpoint. These two are the same, these two are the same but these two aren't the same. So, it's not the midpoint.



# Student Reflections

! Questionnaires/Discussions

!

# Take-Home Tool

- ! Stage 1: Evaluate Student Communication
- ! Stage 2: Evaluate Group Communication
- ! Stage 3: Evaluate Your Communication
- ! Stage 4: Try the Interventions

# Tips: Getting Started with AR

- ! Identify relevant question(s)
- ! Make a plan to answer question(s)
  - ! Who will be involved
  - ! What are some potential actions
  - ! What evidence will be collected
  - ! How and when will the evidence be evaluated
- ! Start your cycles
  - ! Planning



# Questions

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# References

- ! Brodie, K. (2000). Teacher intervention in small-group work. *For the Learning of Mathematics*, 20(1), 9-16.
- ! Dekker, R. &