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## Talking in Math Class? Encouraging Engagement and Achievement Through the Use of Talk Moves

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# Talking in Math Class? Encouraging Engagement and Achievement Through the Use of Talk Moves

By Monika Burnside and Jessica King

Mentors: Dr. Jessica Shumway and Dr. Kaitlin Bundock



# Literature Review

The background of the slide is white with abstract, overlapping geometric shapes in various shades of blue (light blue, medium blue, and dark blue) on the right side, creating a modern, professional look.

# Talking About Math

- ▶ Academically productive talk supports learning
  - ▶ Builds culture of risk-taking and respect
  - ▶ Increases attention
  - ▶ Increases self-efficacy
  - ▶ Develops mathematical understanding



# Math Talk in the Standards

- ▶ In order to be "mathematically proficient," Common Core State Standards for Mathematical Practices require students to:
  - ▶ Critically analyze the math problems
  - ▶ Justify their conclusions
  - ▶ Communicate what one has learned, using mathematical definitions to clearly and accurately explain their reasoning
  - ▶ Construct viable arguments and critique the reasoning of others
  
- ▶ <http://www.corestandards.org/Math/Practice/>

# Math Talk Is Not Happening

- ▶ Discussions aren't happening frequently enough
- ▶ In classrooms with culture of active participation, both silent and vocal active participants made similar gains (O'Connor, 2017)
  - ▶ Suggests that it is important that math talk is happening in math class; silent and vocal students benefit

# Overview: Teacher Talk Moves

**Math Talk Moves**

	<b>Revoicing</b> "So you're saying that _____. Do I have that right?"
	<b>Repeating</b> "Can you restate or rephrase what _____ just said?"
	<b>Reasoning</b> "Do you agree or disagree, and why?"
	<b>Adding On</b> "Would someone like to add on?"
	<b>Waiting</b> "Take your time...we'll wait..."
	<b>Turn &amp; Talk</b> "Partner turn and talk or think-pair-share"

\*Summary Tables of Productive Talk Moves\* from Classroom Discussions in Math: A Teacher's Guide for Using Talk Moves to Support the Common Core and More, Grades K-4 by Suzanne H. Chapin, Catherine O'Connor, and Nancy Caravan Anderson, Copyright © 2013 by Scholastic Inc. All rights reserved. Item # 594883.

 **Math Solutions.** | [mathsolutions.com](http://mathsolutions.com)

- ▶ Families of conversational tools
- ▶ Increase higher-level thinking
- ▶ Promote mathematical discourse

<https://www.smore.com/48a37-talk-moves>

# Focus: Teacher Talk Moves



## Revoicing

"So you're saying that \_\_\_\_\_.  
Do I have that right?"



## Repeating

"Can you restate or rephrase  
what \_\_\_\_\_ just said?"



## Adding On

"Would someone like to add on?"



# Purpose of the Study

- ▶ Investigate the variations in three second-grade teachers' implementation of a number sense curriculum, in particular the variations in the ways they used **Talk Moves** to encourage students' engagement in classroom discussions.
- ▶ Long Term Goal: To improve number sense instruction in early elementary grades.

# Research Questions

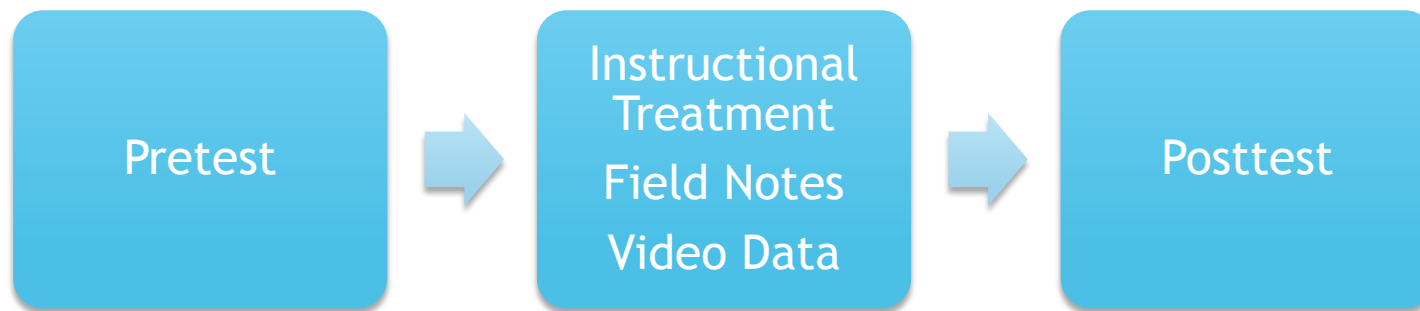
1. How frequently did teachers use each of the Talk Moves?
2. What is the relationship between the frequency of teachers' use of Talk Moves and students' engagement rates?
3. What is the relationship between the frequency of teachers' use of Talk Moves and students' achievement scores?

# Methods

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily located on the right side of the page, creating a modern, layered effect against the white background.

# Participants, Setting, and Procedure

- ▶ 3 teachers in public and charter schools
- ▶ 45 students
- ▶ Second-grade mathematics classrooms



# Instructional Treatment: Number Sense Curriculum

Show Quick Image

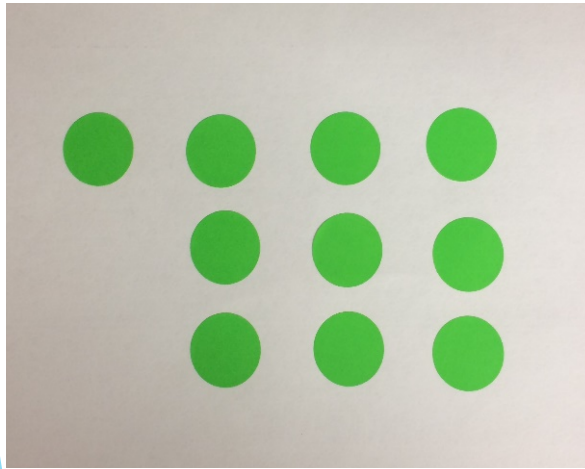
A light blue downward-pointing arrow indicating the flow from the first step to the second.

Pair-Share Discussion

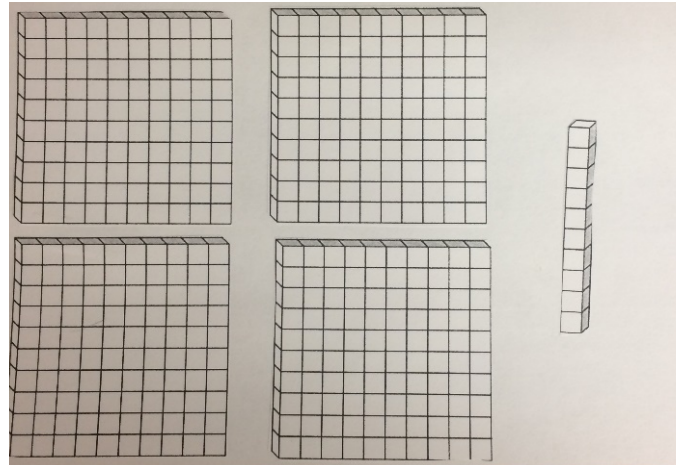
A light green downward-pointing arrow indicating the flow from the second step to the third.

Whole-Class Discussion

# Quick Images Examples



Week 1



Week 4



Week 8

# Data Sources

Subset of data from a larger mixed methods classroom-based research study

## Talk Moves

- Instructional Treatment
- Video Data (9 per teacher)
- Frequency counts

## Engagement

- Instructional Treatment
- Field Notes (2-3 Target Students and randomized comparison students)

## Achievement

- Number Sense - Pre/ Post Test (45 students)

# Data Analysis

## Descriptive statistics

- Teacher Talk Moves:
  - Frequency counts of teachers' use of Talk Moves

## Visual analysis

- Students' Engagement:
  - Frequency counts of students' active engagement, passive engagement, and off-task behavior

## Paired-samples $t$ -test

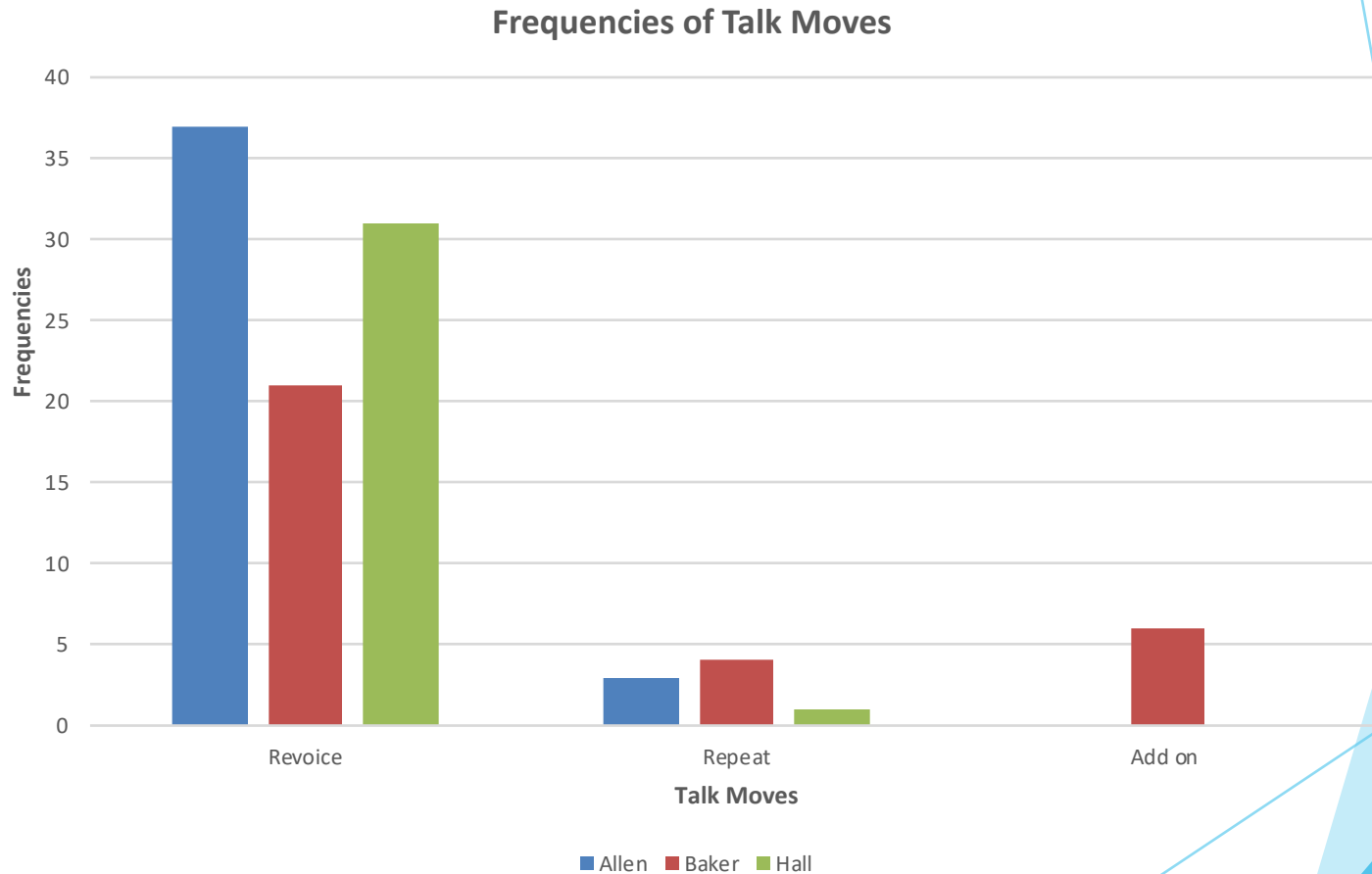
- Students' Achievement
  - Number sense pretest and posttest scores



# Results

The background of the slide is white with abstract blue geometric shapes on the right side. These shapes include overlapping triangles and polygons in various shades of blue, ranging from light sky blue to a deep navy blue. The shapes are layered, creating a sense of depth and movement.

# 1. How frequently did teachers use each of the Talk Moves?



# Talk Move: Adding On

**Student 1:** I saw 4 in a row going down.

**Teacher:** How many columns of 4? Show me how many columns of 4 we can see with your fingers (to whole class).

**All Students:** Holding up six fingers

**Teacher:** So 6 columns of 4

**Student 2:** So is that  $6 \times 4$ ? (Student 1 shaking his head yes)

**Teacher:** Student 1 said that is exactly what he was trying to say.

**Student 3:** ...and then  $6 \times 8$  is 48.

**Teacher:**  $6 \times 8$  is 48. How did you get  $6 \times 8$ ?...Let's build on your good thinking.

**Student 3:** Student 2 said,  $4 \times 6$ , yes that is true, but I counted all rows of 6 and I put them together.

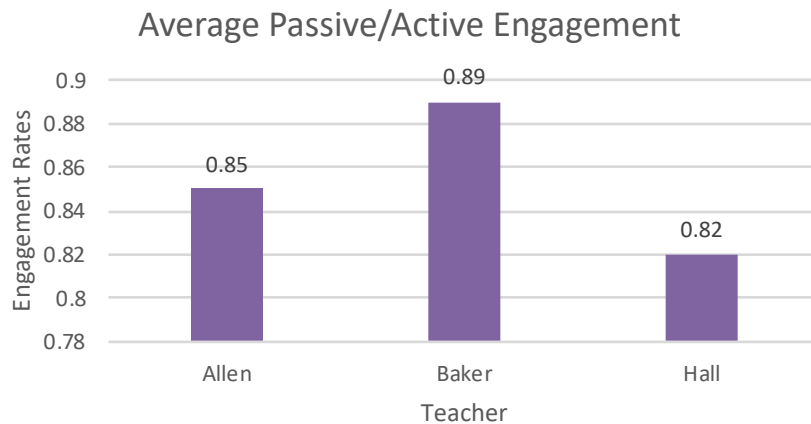
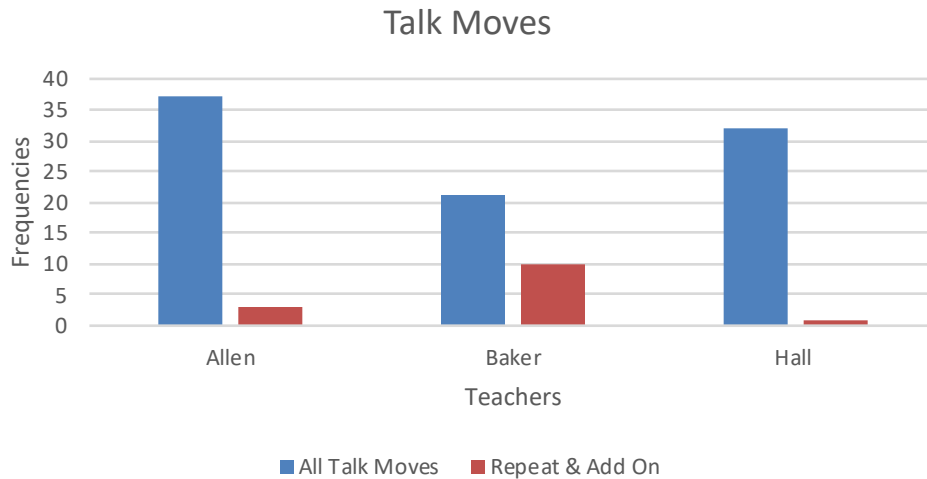
**Teacher:** So you did rows of 6?

**Student 3:** I counted the bottom rows too so its going to be 8.

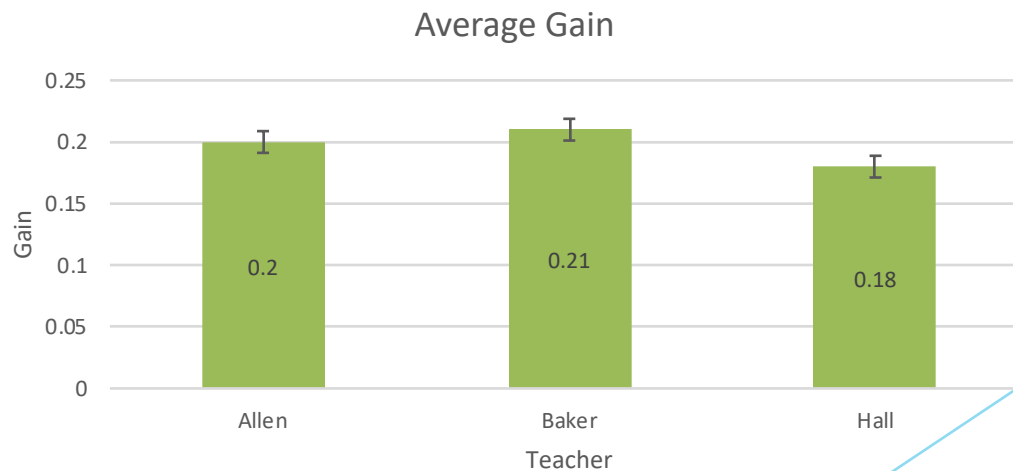
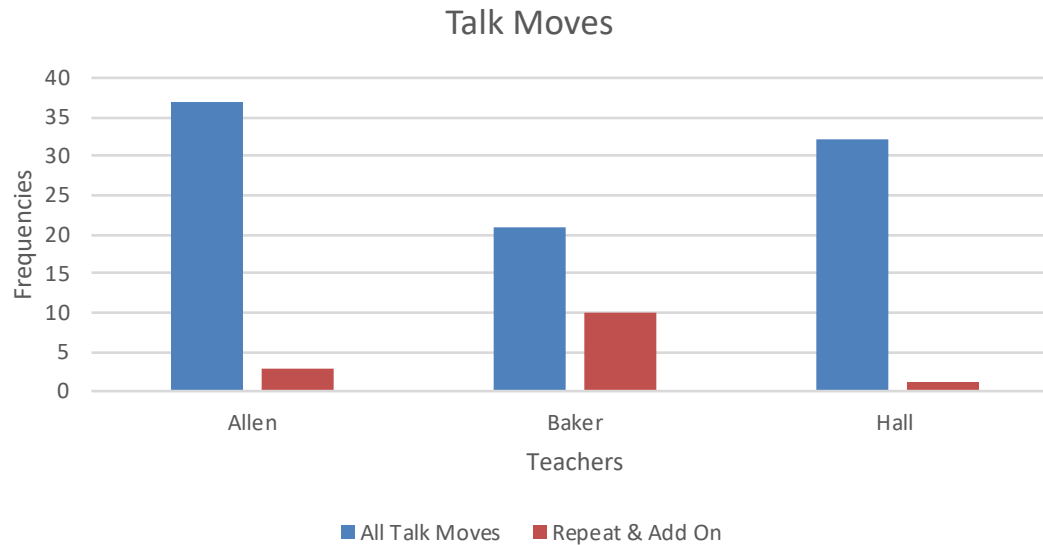
**Teacher:** So that is how you found  $6 \times 8$ ?



## 2. What is the relationship between the frequency of teachers' use of Talk Moves and students' engagement rates?



### 3. What is the relationship between the frequency of teachers' use of Talk Moves and students' achievement scores?



# Limitations

- ▶ Small sample size and the general complexities of classroom cultures and environments.
- ▶ We are careful to not make causal claims.

# Conclusion

- ▶ RQ 1: Revoicing was the most common talk move used by teachers in our study. One teacher used repeating and adding on more than the other teachers.
- ▶ RQ 2: This preliminary visual analysis suggests that Ms. Baker's use of adding on moves might have contributed to higher rates of student engagement.
- ▶ RQ 3: There was not a relationship between talk moves and achievement.

# Questions?

**We are members of the  
Early Mathematics  
Research Group  
Dr. Jessica Shumway  
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