# Research-based Learning Trajectories: What are they and how do you use them?

Michelle Douglas-Meyer
Nikki Hawkins
Melissa Hedges

Thursday, May
Kern Hall—Brayton Case B
2:30 p.m. – 3:30 p.m.

Empowering Mathematical Learning through Assessment

Strong Start Math

MPS UWM

# Agenda

- Introduce learning trajectories
- Examine the comparing trajectory
- Consider instructional moves to encourage student movement along the comparing trajectory

Strong Start Math

MPS UWM

# Learning Targets

We will

- Gain knowledge around learning trajectories, specifically the comparing trajectory.
- Deepen our understanding of the developmental progression children follow as they learn to compare quantities.
- Understand how to support student's movement on a learning trajectory, using the comparing trajectory.

Strong Start Math

MPS UWM

# Success Criteria

We will be successful when we can make use of the comparing trajectory for instructional planning.

Strong Start Math

MPS UWM

# Learning Trajectories

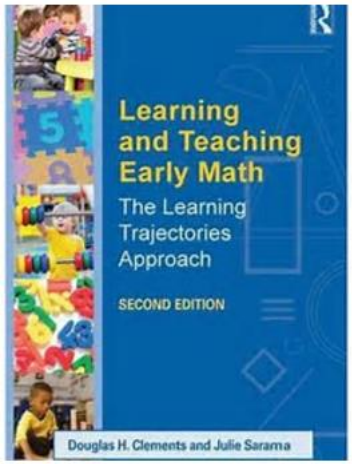
Strong Start Math

MPS UWM

# Learning Trajectories: An Introduction

https://www.youtube.com/watch?v=0KiBDbNvQF0

Share with your partner your understanding of the three parts of a math learning trajectory.




Strong Start Math

MPS UWM

# Three Parts of a Math Learning Trajectory

1. Math Goal
   - Include big ideas (Foundational Concepts)
2. Developmental Path
   - Typical developmental learning route
3. Instructional Tasks
   - Matched to each level of thinking
   - Promote children's growth from one level to the next

Strong Start Math

MPS UWM

# Why Use Learning Trajectories?

Doug Clements

https://www.youtube.com/watch?v=OSL6x4iBpCk

According to Doug Clements, how might an understanding of learning trajectories benefit both students and teachers?

Strong Start Math

MPS UWM

# Three Research Findings

1. Learning substantial math is critical for primary grade children.
2. All children have the potential to learn challenging and interesting math.
3. Understanding children's mathematical development helps teachers be knowledgeable and effective in teaching math.

Strong Start Math

MPS UWM

# The Learning Trajectories Approach

Read and highlight:

p. 2 “Teaching Challenging and Interesting Math”

Share two ideas you highlighted and why you found them important.

Strong Start Math

MPS UWM

# Exploring the Comparing Trajectory

Read through each level of the developmental path children travel on as they learn to compare quantities.

Place them in the order that makes sense to you as you reflect on how children develop and grow in their understanding of comparing quantities.

# Comparing Quantities Progression

- Compares same-sized collections of physically similar objects of 1–6 by matching. Identifies collections as “the same.”
- Compares different-sized collections of 1-6 of physically similar objects by matching. Identifies collections as “more,” “less” or “the same.”
- Compares collections of same-sized objects in groups of 1-5 by counting. Identifies collections as “more,” “less” or “the same.”
- Compares accurately by counting, even when larger collection’s objects are physically smaller up to 5. Able to figure out how many more or less.
- Compares sets by counting, even when larger collection’s objects are physically smaller, up to 10. Able to figure out how many more or less.

Strong Start Math

MPS UWM

# Asher and the Bear and Chairs

Where would you place Asher on the comparing trajectory? Why?

Strong Start Math

MPS UWM

# Checking in

As you reflect on the trajectory, what are some of the characteristics of this learning trajectory that would be helpful during instructional planning?

Strong Start Math

MPS UWM

# A DEEPER UNDERSTANDING OF COMPARING

Strong Start Math

MPS UWM

# Supportive Language

When children are learning the relationships of *more* and *less,* the language we commonly use can sometimes get in the way. In order to have children consider these relationships without the interference of difficult language structures, we have to change the language and the setting.

We can help children compare groups of different sizes by using language patterns that they can understand more easily.

Richardson, K. (1999). Developing number concepts: Counting, comparing, and pattern (Book 1). Dale Seymour Publications: Parsippany, NJ.

Strong Start Math

MPS UWM

# Begin with natural contexts

What are some contexts that occur during a young child's day when they need to compare quantities?

Crackers and children

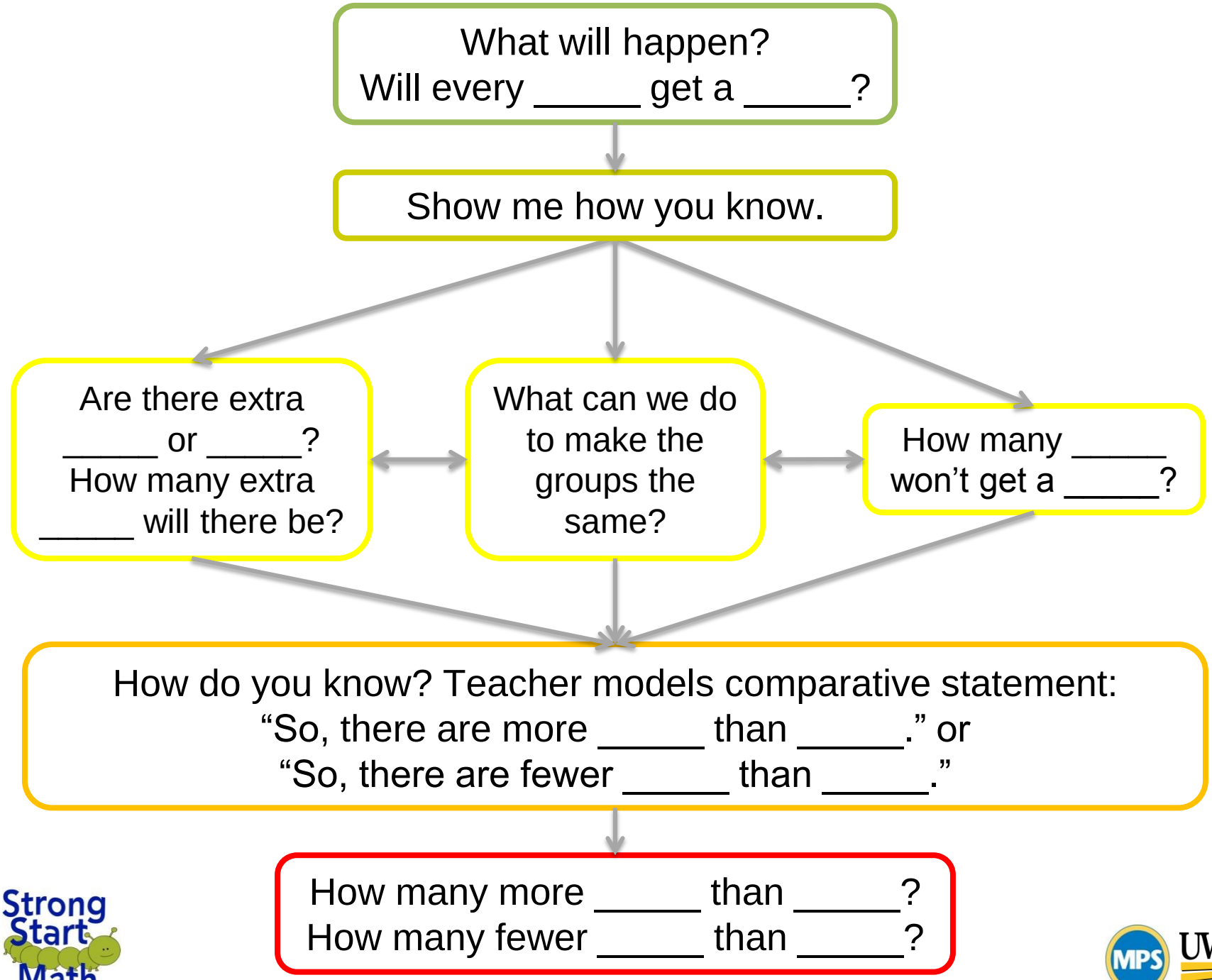
Toy trucks and blocks to park on

Dolls and bibs

Coat hooks and jackets

Strong Start Math

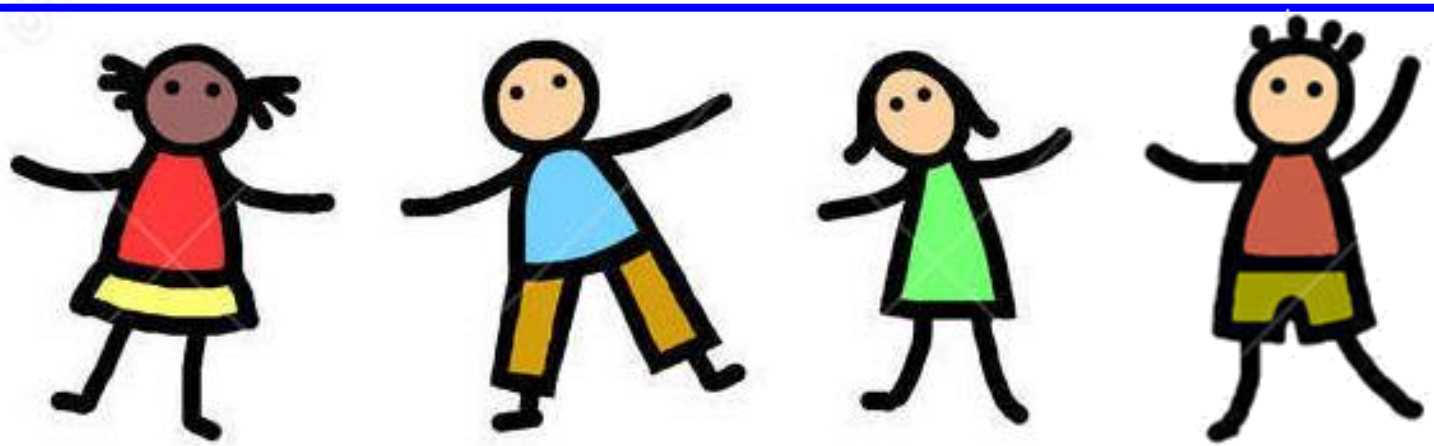
MPS UWM




Strong Start Math

MPS UWM

Ms. Douglas-Meyer asked 6 children to grab a pillow and join her in the math corner.



What will happen?
Will every child get a pillow?

Show me how you know.

Are there extra pillows or children? How many extra children will there be?

What can we do to make the children and pillows the same?

How many children won't get a pillow?

How do you know? Teacher models comparative statement:
"So, there are more children than pillows." or
"So, there are fewer pillows than children."

How many more children than pillows?
How many fewer pillows than children?

Ms. Douglas-Meyer asked 6 children to grab a pillow and join her in the math corner.

Strong Start Math

MPS UWM

# Practicing with some natural contexts.

There are six bears and 4 chairs.

There are 11 milk cartons and seven straws.

There are five friends at the birthday party. There are eight balloons.

What will happen?
Will every milk get a straw?

Show me how you know.

There are 11 milk cartons and 7 straws.


Are there extra straws or cartons? How many extra cartons will there be?

What can we do to make the cartons and straws the same?

How many cartons won't get a straw?

How do you know? Teacher models comparative statement:
"So, there are more cartons than straws." or
"So, there are fewer straws than cartons."

How many more cartons than straws?
How many fewer straws than cartons?

Strong Start Math

MPS UWM

# Learning Targets

We will

- Gain knowledge around learning trajectories, specifically the comparing trajectory.
- Deepen our understanding of the developmental progression children follow as they learn to compare quantities.
- Understand how to support student's movement on a learning trajectory, using the comparing trajectory.

Strong Start Math

MPS UWM


http://uwm.edu/education/research/centers/cmser/strong-start-math/

# Thank you for coming!

Strong Start Math

MPS UWM