Welcome to Erikson Early Math iNNOVATIONS!

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early mathematics education

Introductions

Count Around

Focus for Today

- Content: ***Numerosity & Number Sense***
- Strategy: ***Turn & Talk***

How well do you know your numbers?

- What do you notice about these number names?
- Turn to a partner and talk about your ideas.
- Share your thinking with the rest of the people at your table.

You and a partner are going to explore how this number system works.

- Use the cubes to represent these quantities: “bumpit,” “yan-a-pimp” & “tethera-dik”
- Draw a picture to show “tan-a-figgit” sheep.
- Work to create written symbols to represent this number system.

A new shepherd has just arrived from distant parts and needs to learn how to count the sheep and keep track of the quantity. You and the other people at your table need to create a ***poster to explain how this number system works***.

Also include any ***questions*** you have about this number system.

Gallery Walk of Posters

- You now have a few minutes to look at the posters made by other table groups.
- Examine ***at least one*** poster carefully & consider what questions or comments you have about the math you see. *(If time permits, move on to another poster.)*
- Use your sticky notes to leave comments or questions on the poster(s) you examine.
- Put at least one sticky note on each poster you examine.

New Understandings

- What have we learned about numbers in general?
- What have we discovered about doing math?

Count Around Again …

… this time with Shepherds' Numbers!

Shepherds' Numbers

yan	*tan*	*tethera*	*pethera*	*pimp*
yan-a-pimp	*tan-a-pimp*	*tethera-pimp*	*pethera-pimp*	*dik*
yan-a-dik	*tan-a-dik*	*tethera-dik*	*pethera-dik*	*bumpit*
yan-a-bumpit	*tan-a-bumpit*	*tethera-bumpit*	*pethera-bumpit*	*figgit*

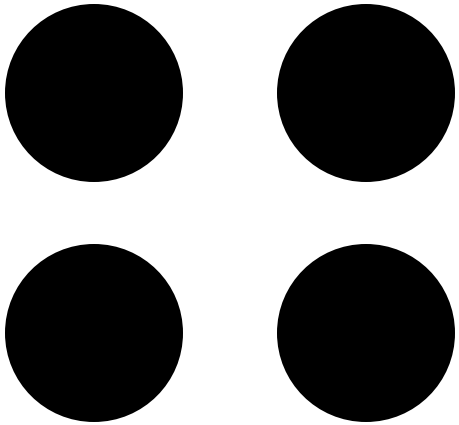
How do children develop understanding of numerosity & number sense?

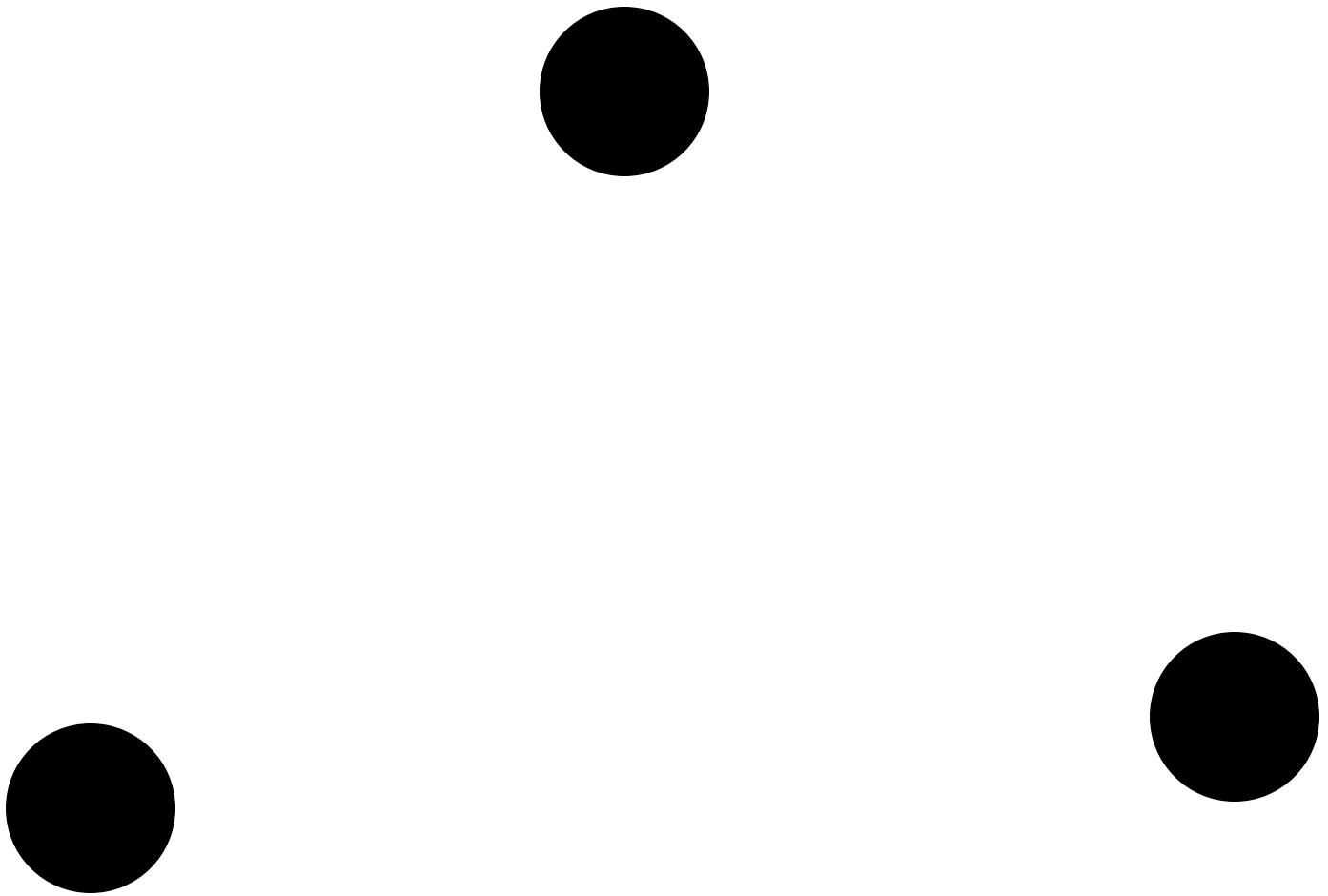
What are the ***Big Ideas***?

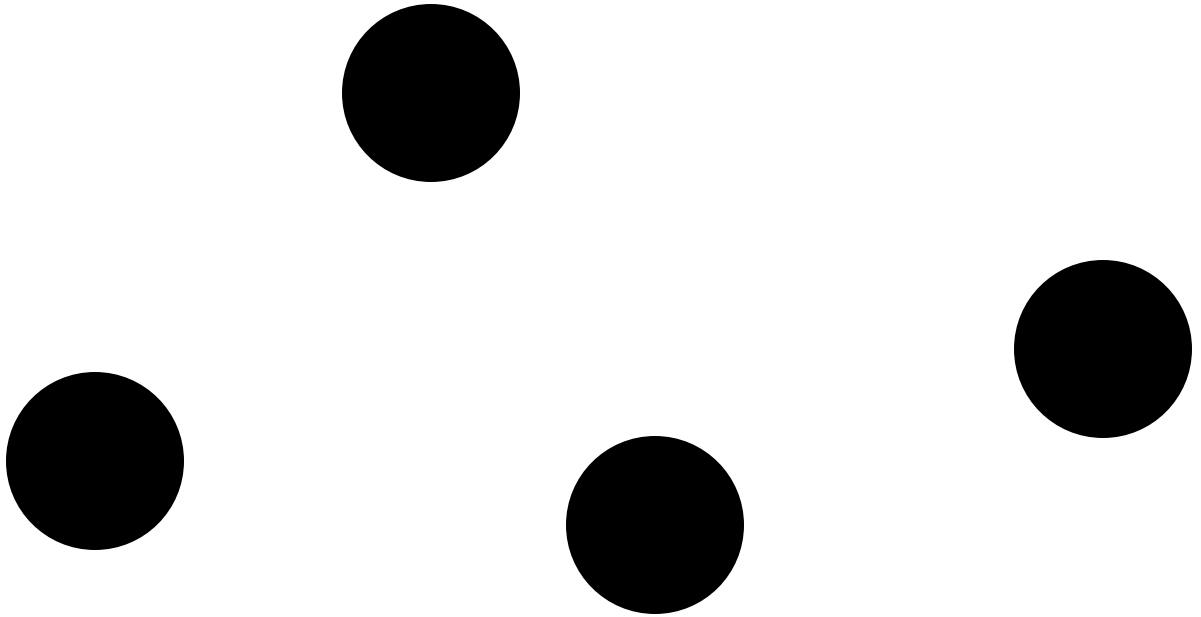
A ***Big Idea***

Quantity is an attribute
of a set of objects
& we use numbers
to name specific quantities.

What can you see quickly?

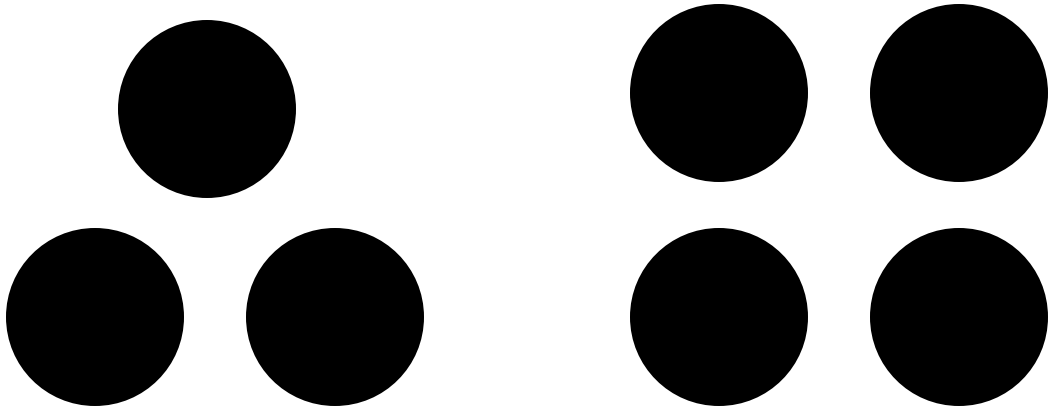


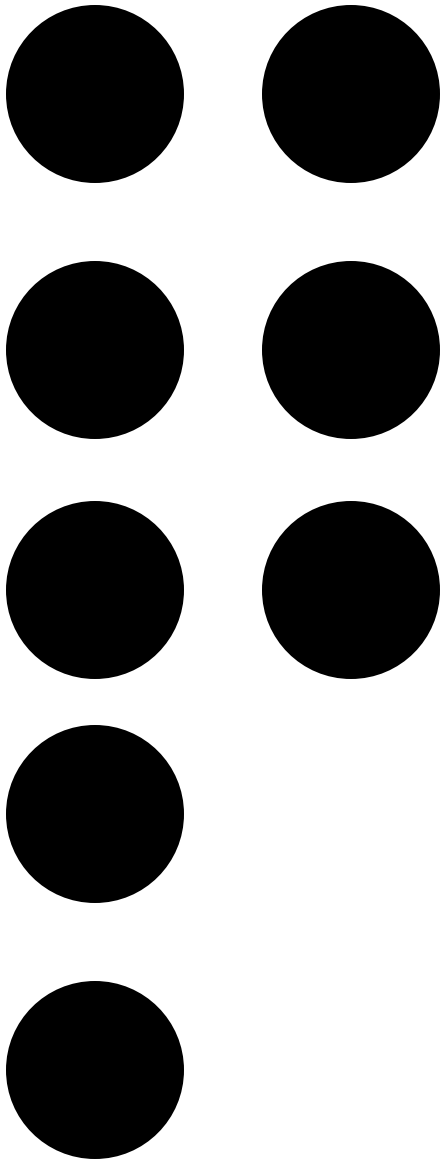


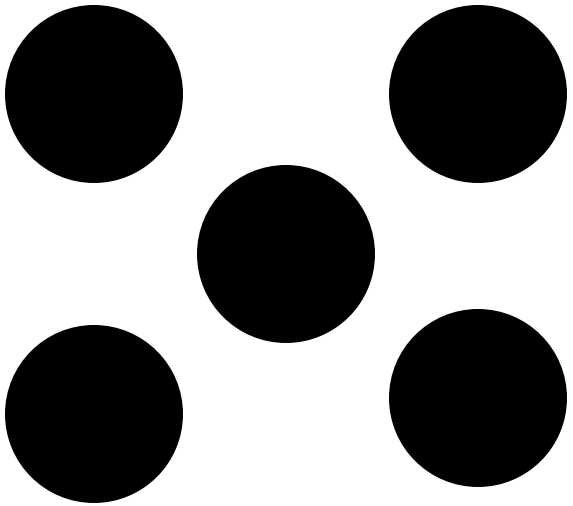


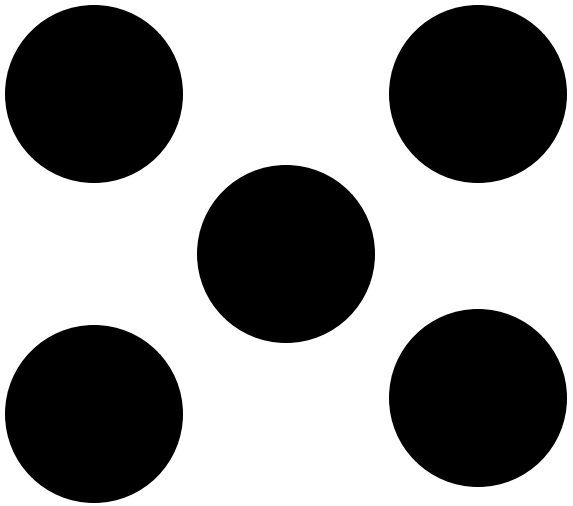
Perceptual Subitizing

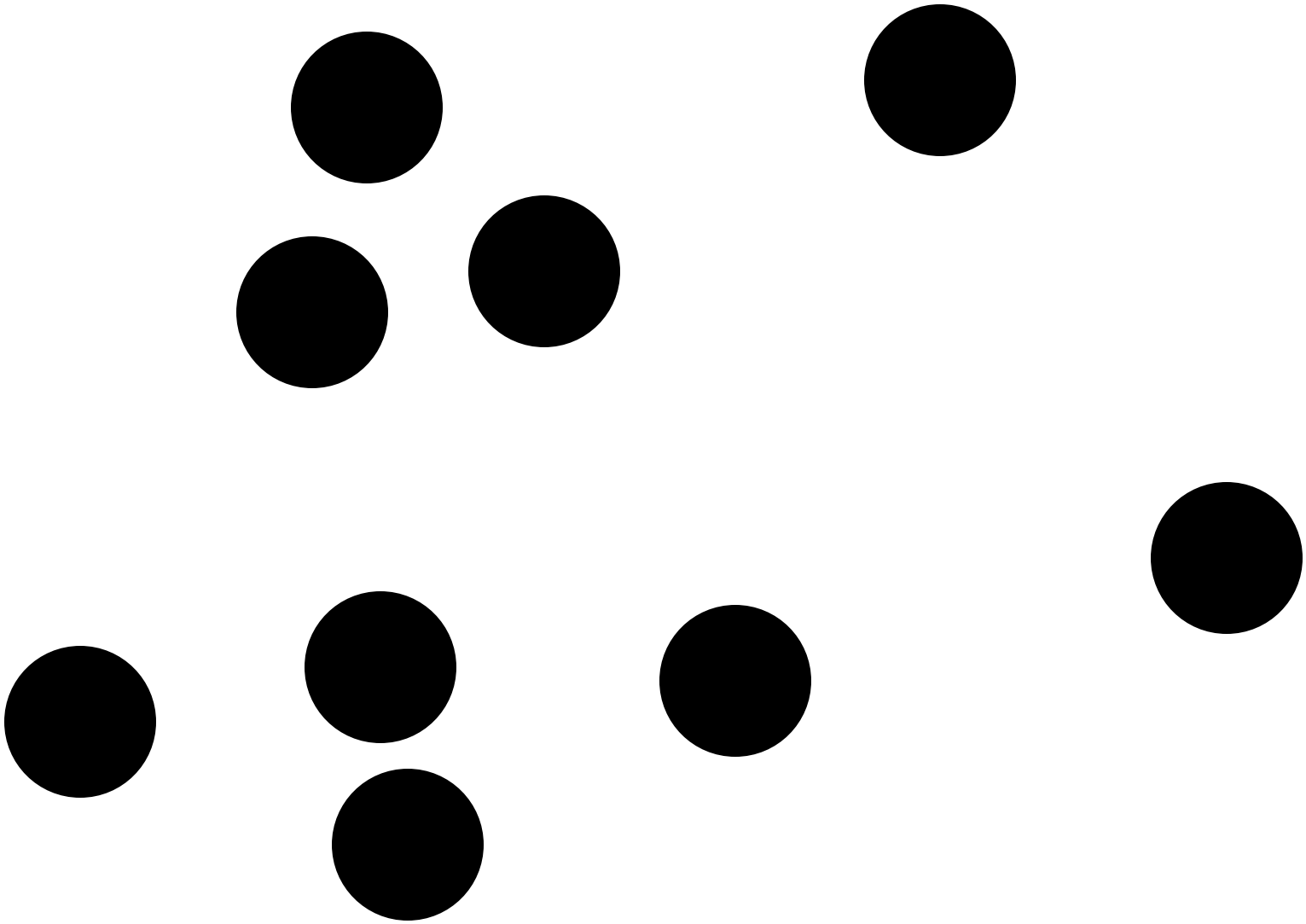
- You perceive the three or four dots simultaneously.
- You “just know.”











Conceptual Subitizing

- You perceive the parts and put together the whole
- All of this happens quickly and often is not conscious - it is still subitizing

Video Analysis

Focus on the Child: "Matching Quantity"

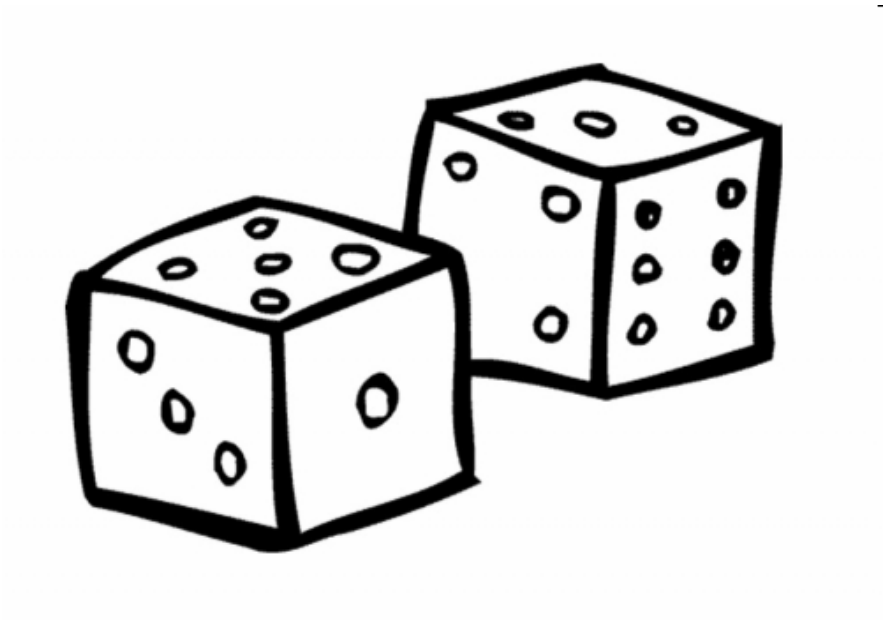
- Turn to a partner & talk about what evidence of children's mathematical thinking & understanding you observed.

Video Analysis

Focus on the Child: "Comparing Quantity"

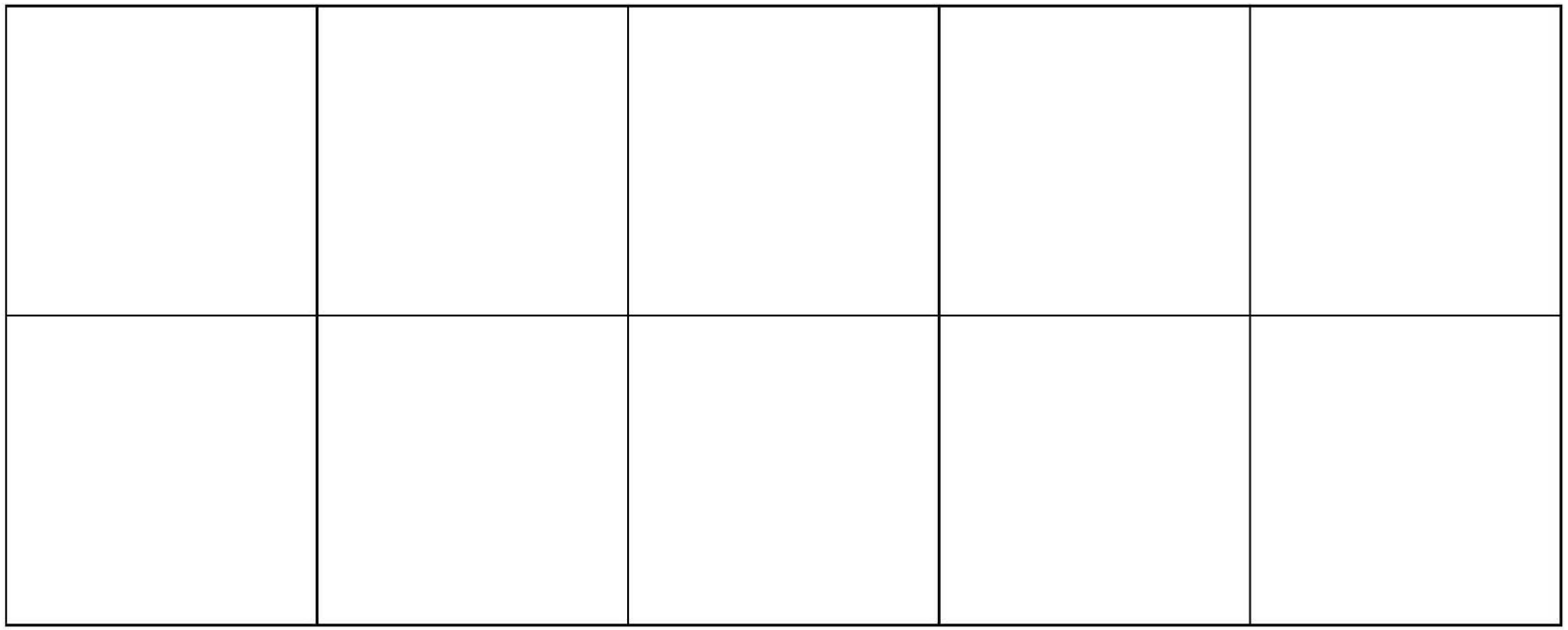
- Turn to a partner & talk about what evidence of children's mathematical thinking & understanding you observed.

Developing Visual Number Sense Through Models



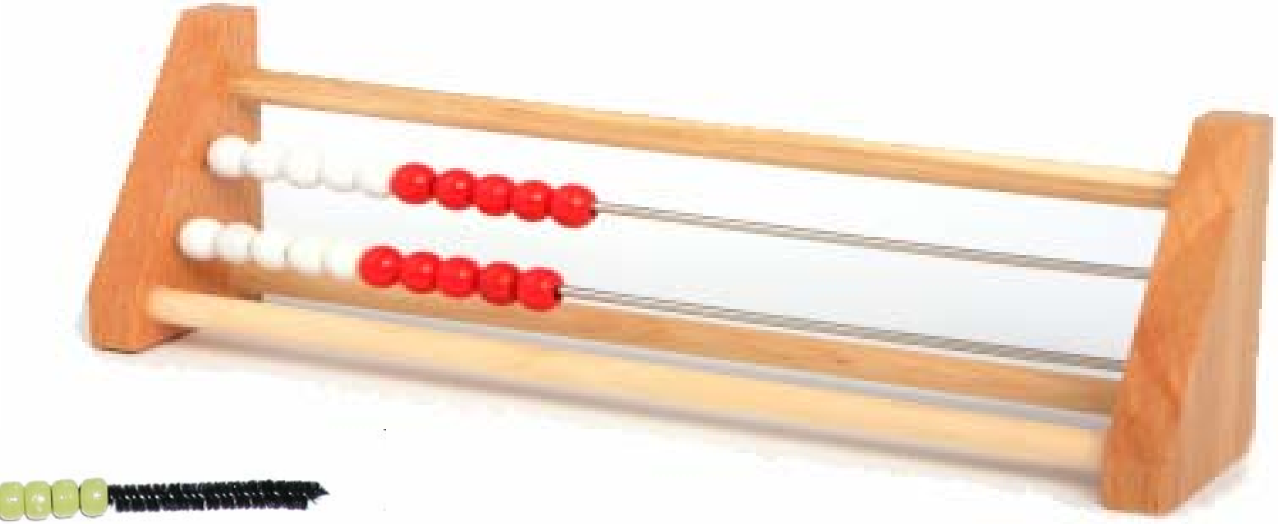
Dice

Developing Visual Number Sense Through Models



Ten-Frames

Developing Visual Number Sense Through Models



Counting Frames

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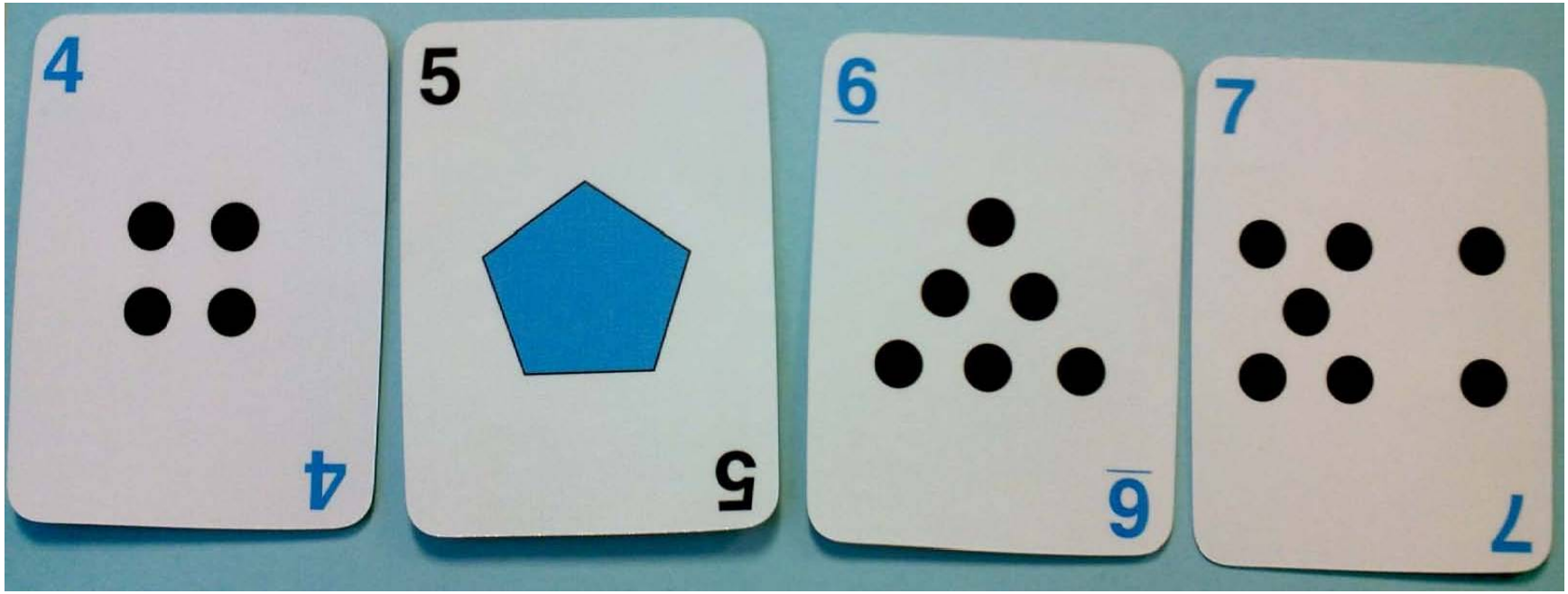
Developing Visual Number Sense Through Models



Number Cards

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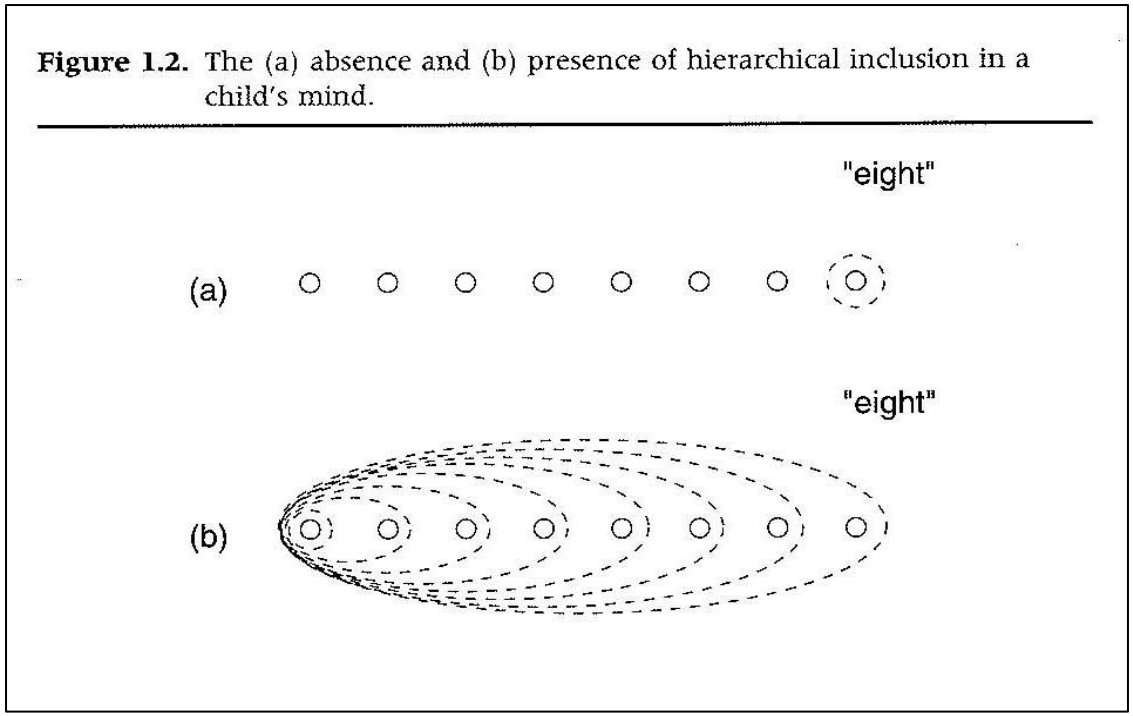
A ***Big Idea***

Number systems use
a fixed sequence
that allows for predictability.

A ***Big Idea***

Because each number names a quantity one greater than the number before it, each number includes all the quantities named by those earlier numbers.



From Kamii,C. *Young Children continue to Reinvent Arithmetic, 2nd Grade.* Teachers College Press, 2004.

Video Analysis

VITAL (Columbia University): "Doubling Pattern"

- Turn to a partner & talk about what evidence of this child's mathematical thinking & understanding you observed.

A ***Big Idea***

- As numbers grow larger, we group by tens to create new units.
  - Because we group by tens, we can represent all numbers using ten digits (0 to 9), and there are patterns to how numbers are represented.

Number is Complex!

A ***Big Idea***

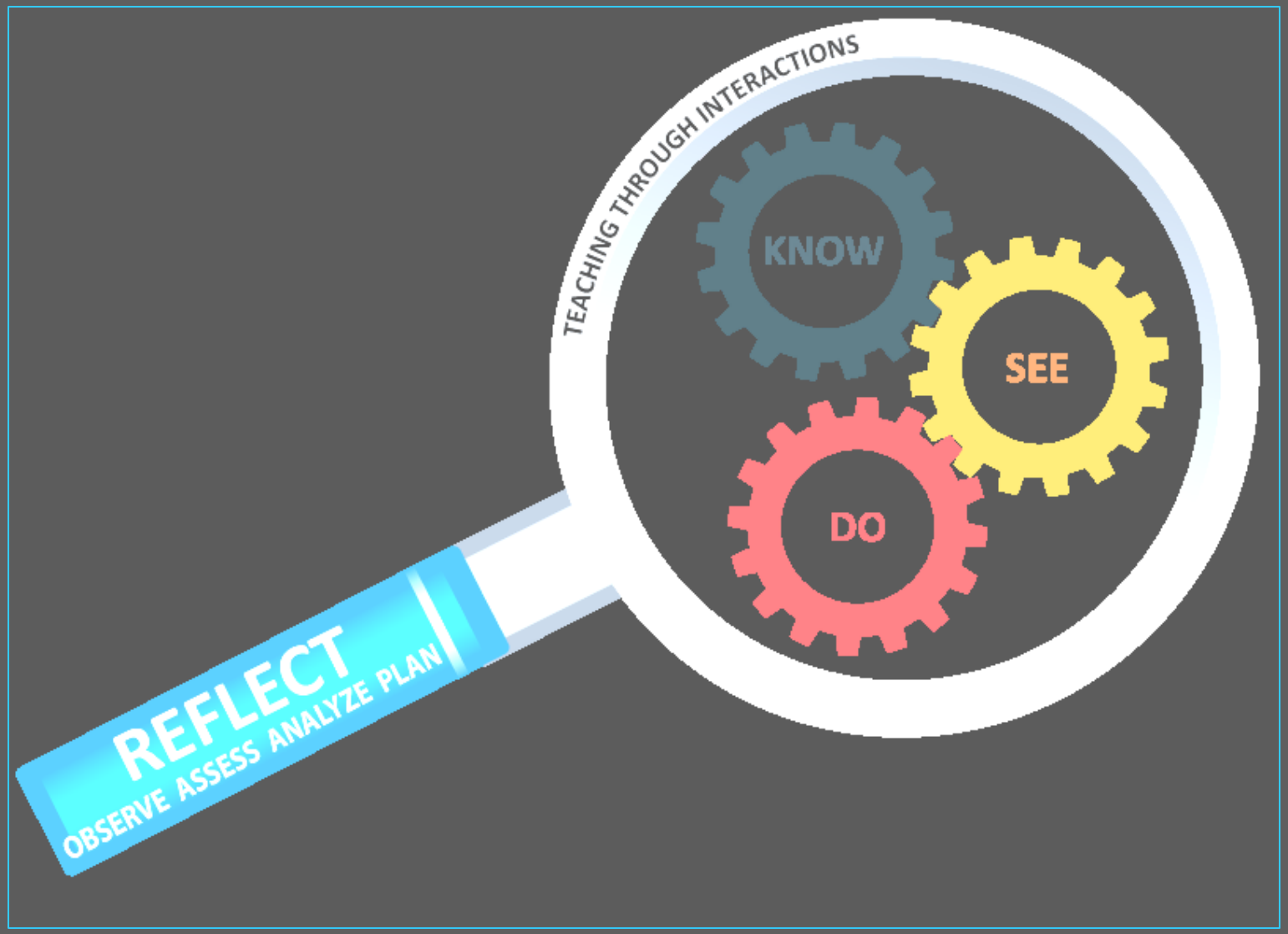
- Numbers are used in many ways, including:
  - to indicate amount (cardinal)
  - to specify positioning a sequence (ordinal)
  - to provide names for members of a set (nominal)
  - to act as shared reference points (referential)

Classroom Teaching

I have concluded that classroom teaching … is perhaps the most complex, most challenging, and most demanding, subtle, nuanced, and frightening activity that our species has ever invented. In fact, when I compared the complexity of teaching with that much more highly rewarded profession, “doing medicine,” I concluded that the only time medicine even approaches the complexity of an average day of classroom teaching is in an emergency room during a natural disaster.

- Lee Shulman, 2004 (p. 504)

Bridget Hamre's framework for change



KNOWING

- Understanding foundational mathematics and current information on how to children learn these concepts as well as current knowledge of how to promote the development of these concepts.

SEEING

- Identifying effective teacher-child interactions that promote the kind of mathematical dispositions that lead to mathematizing in action – both in others as well as in one's own interactions.

DOING

- Enacting effective teacher-child interactions that lead to mathematizing in the classroom.

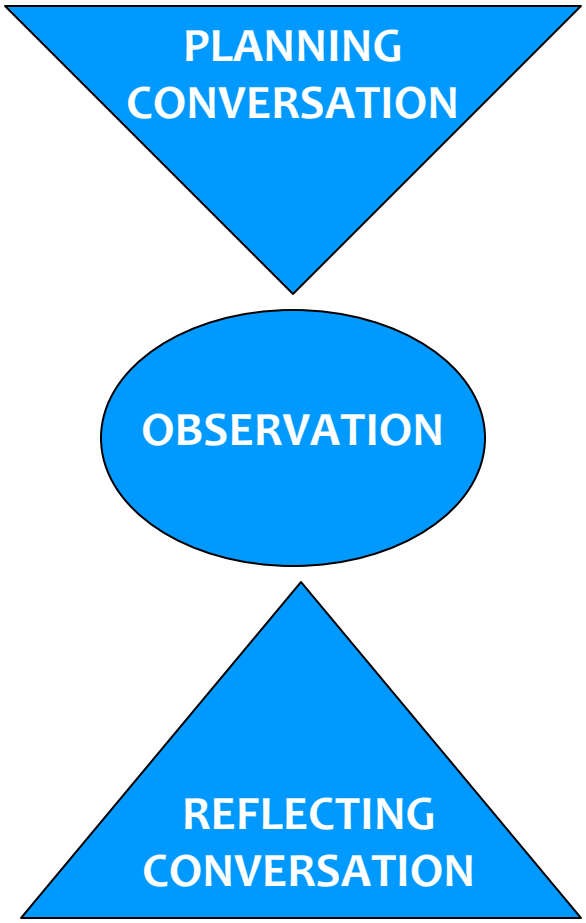
REFLECTING

- Engaging in self-observation and critical analysis of teaching with goal of becoming more effective

Goals of Coaching

- Moving the conscious acts of effective teaching into unconscious, automatic schemas than can be enacted more efficiently and consistently
- Moving ineffective, unconscious schemas into the conscious so that teachers can be more aware of and stop these behaviors

The Overall Coaching Process

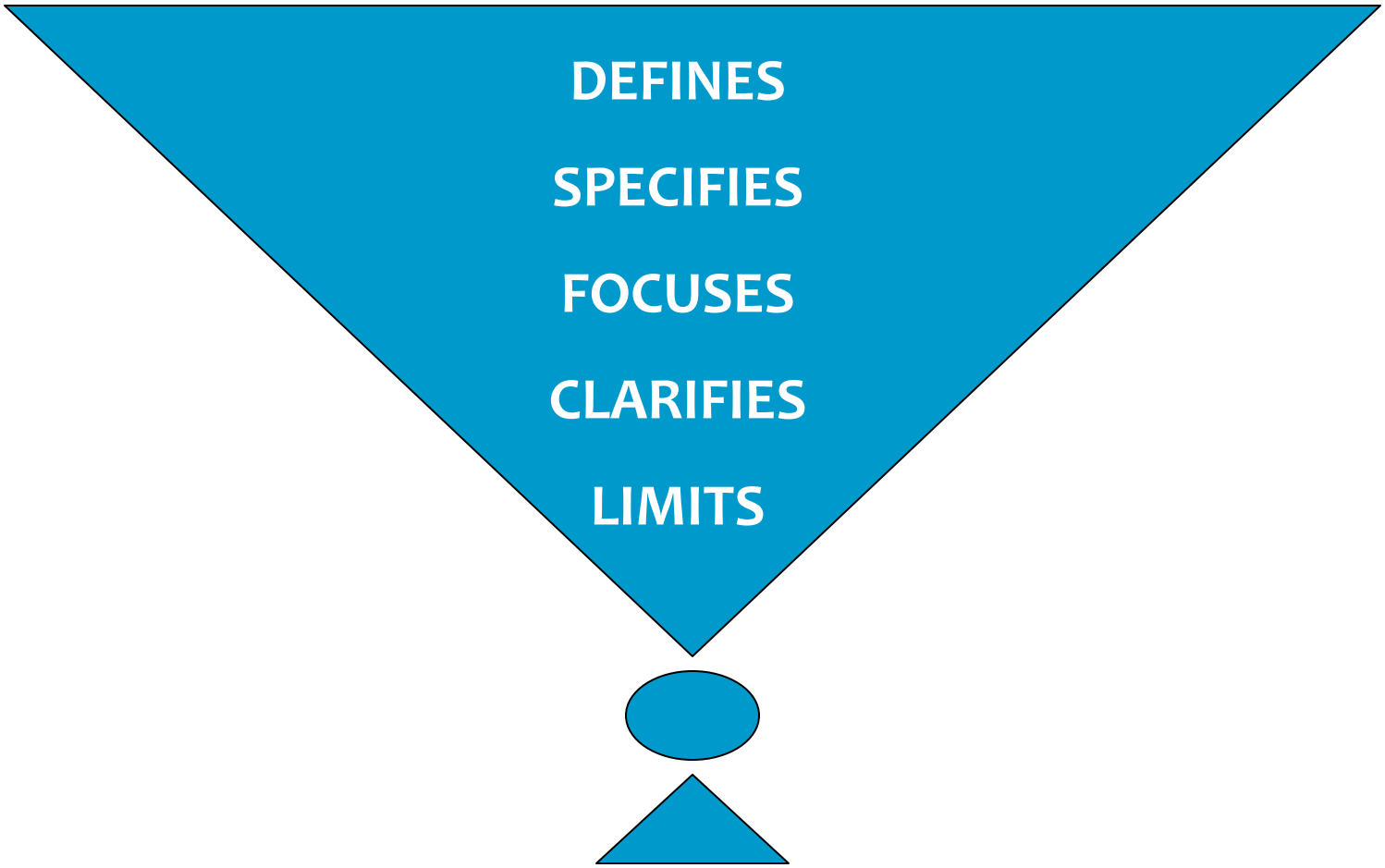


Planning Conversation

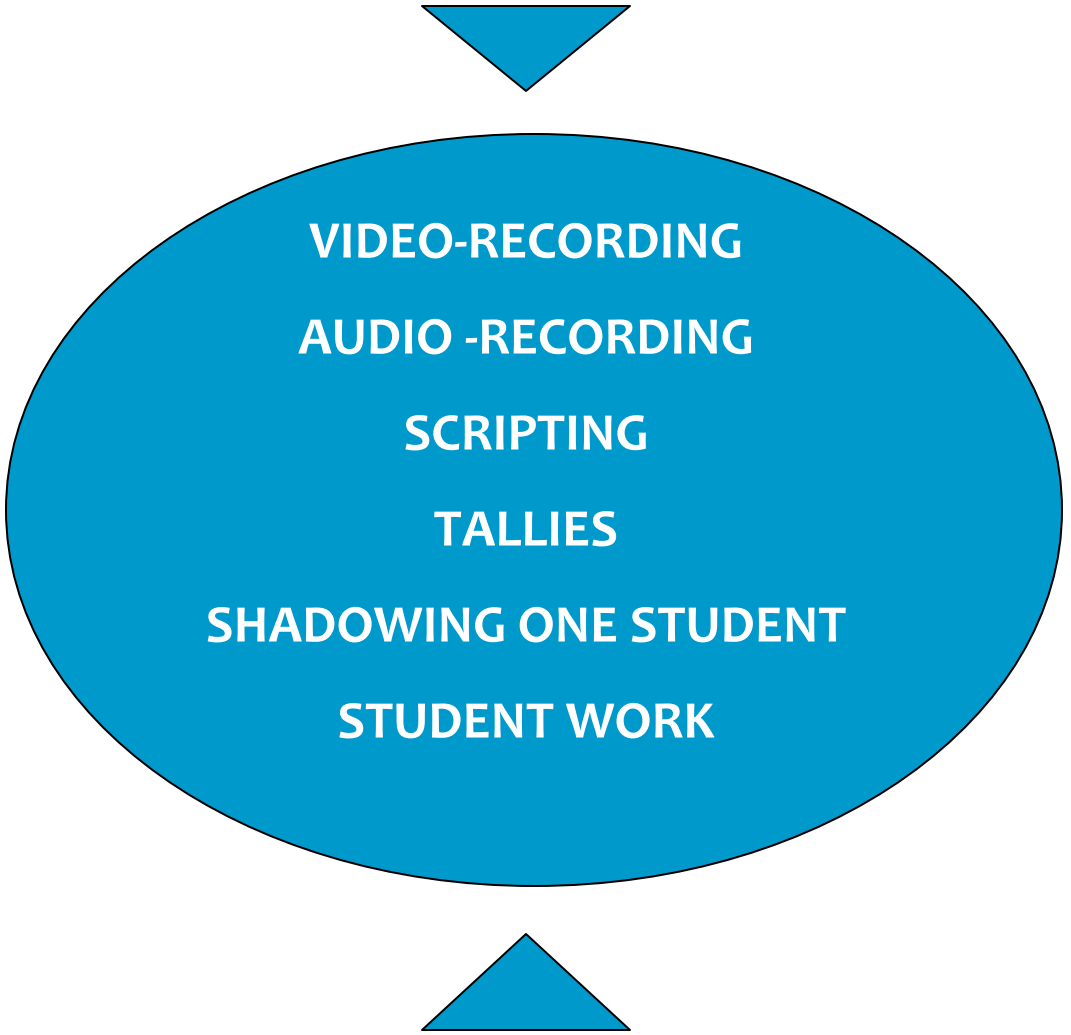
Focus attention on

specific elements of practice

The Planning Conversation: ***Narrowing*** the Scope



Classroom Observation: ***Data Gathering***

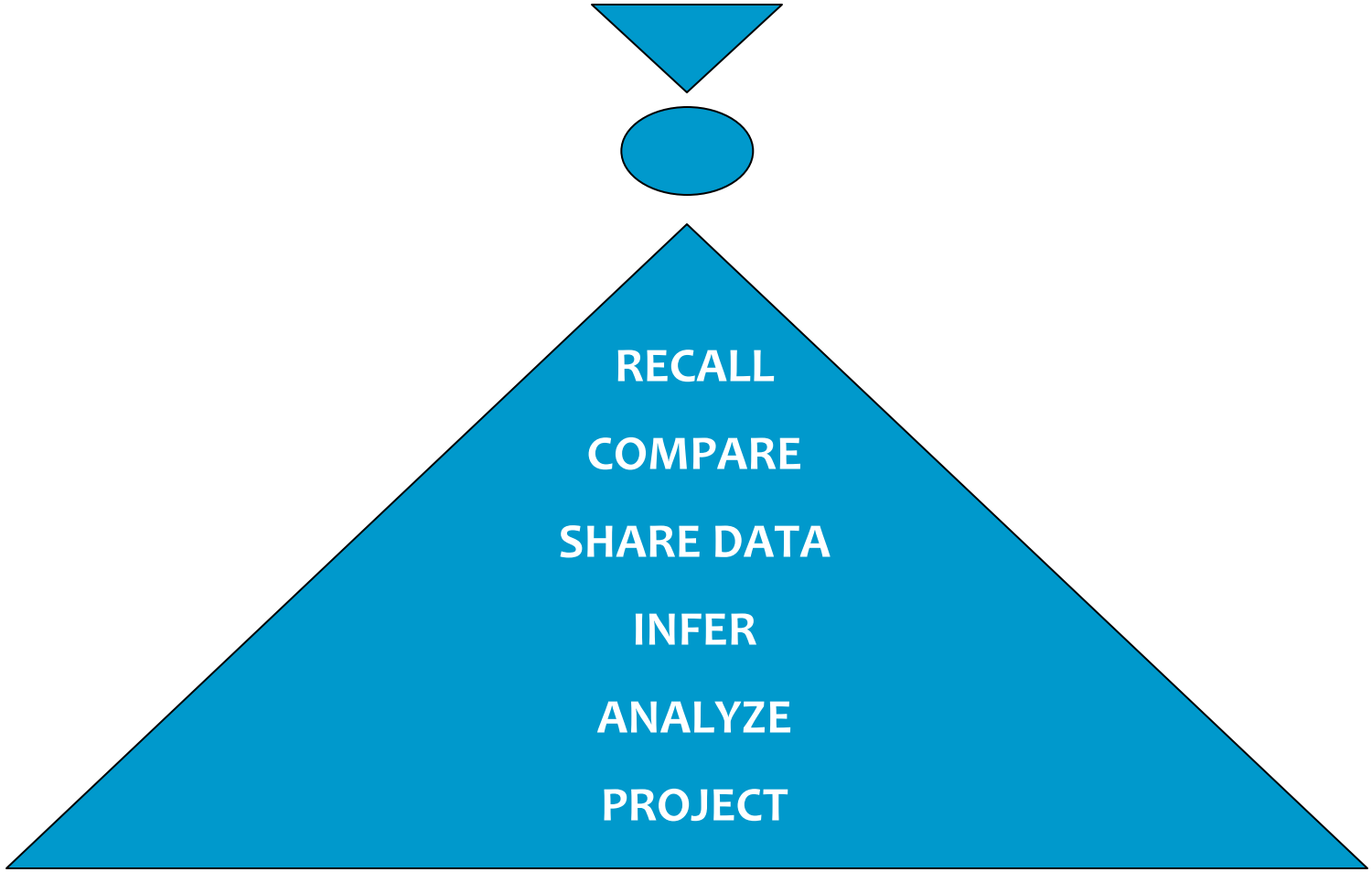


Reflecting Conversation

To reflect effectively, teachers need to:

- ***look*** at the data collected during the observation;
- ***compare*** it to what they expected to get;
- ***observe*** their video-recorded lesson;
- ***assess & analyze*** the data in light of lesson goals & identified High Impact strategies;
- ***plan*** for change.

The Reflecting Conversation: WIDENING the Scope



Acquiring New Skills & Behaviors

LEVELS OF IMPACT / COMPONENTS OF TRAINING	Concept Understanding "Got it"	Skill Attainment "Able to do it"	Application (Work Setting) "Use it"
Presentation	85%	15%	10%
+ Modeling	85%	18%	10%
+ Practice & Low-Risk Feedback	85%	88%	15%
+ Coaching	90%	90%	80%

Percents are not exact – only estimates

From the work of Bruce Joyce and Beverly Showers, presented at the Annual Conference of the National Staff Development Council, March 1982.

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What happens in an effective mathematics classroom?

- Students & teachers believe & experience that math is a sense-making activity to help us understand our world.
- Students & teachers model math in multiple ways.
- Students & teachers talk about math.
- Students & teachers ***do*** math.

High-Impact Strategies to Promote Mathematical Thinking & Action

- What did we do during this learning lab?
- How did our choices and practices affect your learning?

Focus Strategy: ***Turn & Talk***

- Why is it effective?
- How can you make it work for mathematics in your classroom?

Reflecting on Today's Learning

Using good books to help students explore numerosity & number sense

- Where's the math in the book?
  - What are the Big Ideas?
- How can you bring the math out of the book?
  - What kind of activities could you use to develop children's thinking about the math of the book?

Thank you for coming!

Our next Learning Lab is Friday, November 18th.

See you then!