15-Minute In-Service Suites

MATH: NUMBER RECOGNITION AND SUBITIZING

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Math Stretches Across the ELOF Domains

	CENTRAL DOMAINS				
	APPROACHES TO LEARNING	**SOCIAL AND EMOTIONAL DEVELOPMENT**	**LANGUAGE AND LITERACY**	**COGNITION**	**PERCEPTUAL, MOTOR AND PHYSICAL DEVELOPMENT**
INFANT/TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor and Physical Development
PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication / Literacy	Mathematics Development / Scientific Reasoning	Perceptual, Motor and Physical Development

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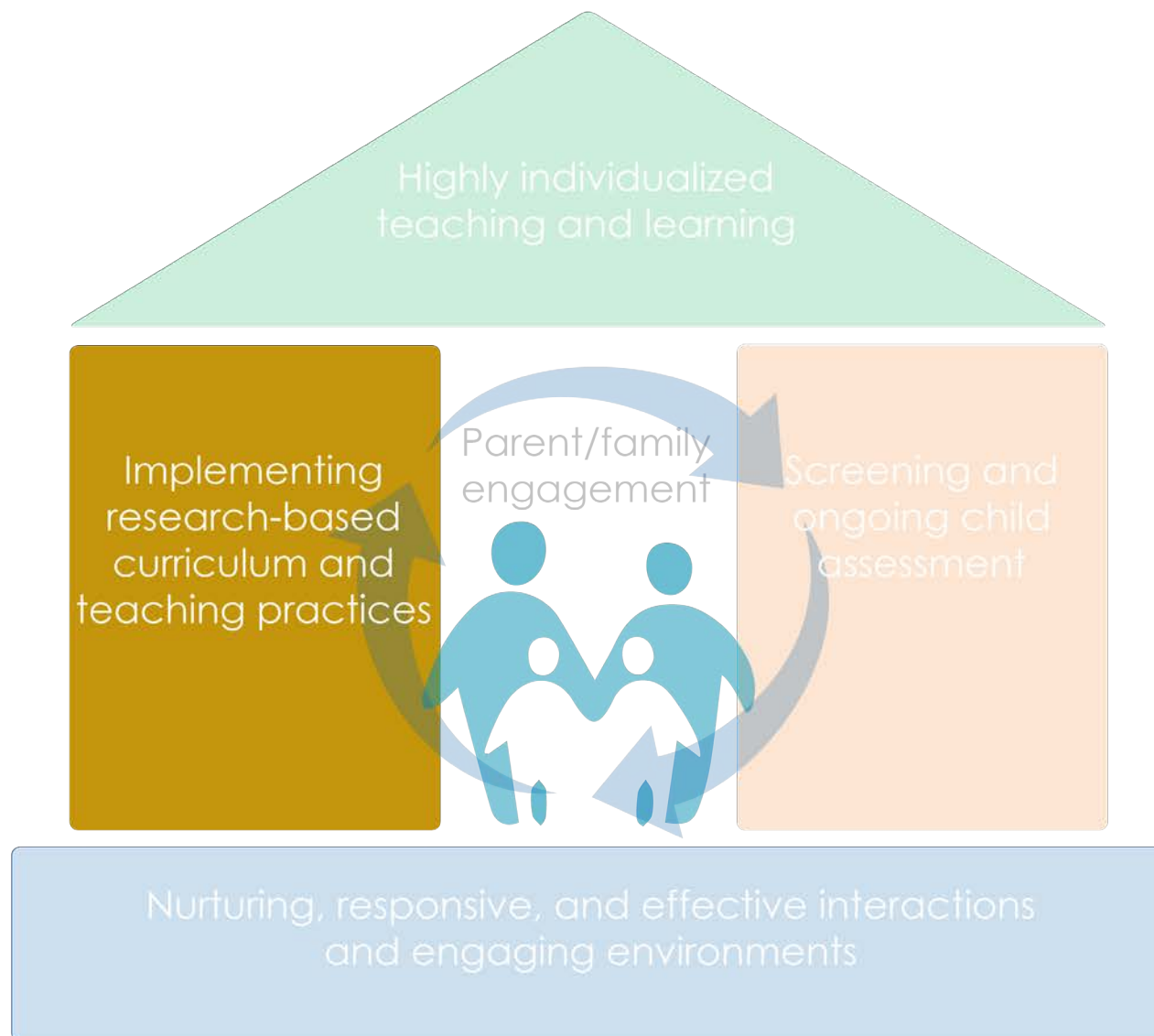
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Math Stretches Across the ELOF Domains

- Cognition (Infant/Toddler)
  - Reasoning and Problem-Solving
  - Emergent Mathematical Thinking
- Cognition/Mathematics Development (Preschooler)
  - Counting and Cardinality
- Approaches to Learning
  - Cognitive Self-Regulation
- Language and Communication
  - Communicating and Speaking

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Highly individualized teaching and learning

Implementing research-based curriculum and teaching practices

Parent/family engagement

Screening and ongoing child assessment

Nurturing, responsive, and effective interactions and engaging environments

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Session Objectives

- Explain *number recognition* and *subitizing* for young children (the goal)

- Identify the *developmental progression* for number recognition and subitizing

- List ways to incorporate subitizing into in everyday *educational activities*, routines, and instruction

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Learning Trajectory

Three Parts:

1. Goal

2. Developmental Progression

3. Educational Activities

Part 1 of the Learning Trajectory

1. **Goal**

2. Developmental Progression

3. Educational Activities

LT *Goal* for Number Recognition/Subitizing

Children recognize and then subitize (recognize quickly) the number in a group *without counting*.

"Look! I have *three* blocks!"

Not this!

5

Number Recognition

- Early number recognition is not (yet!) subitizing.

- Subitizing is the *rapid* recognition of numbers without needing to count.

- Children can first recognize the number in small groups, then they get better and *faster* and can subitize.

Why Is this Goal Important?

Number recognition

- Builds upon the *earliest developing* number sense
  - Infants begin to notice the number of objects in a small group

- Supports learning how to count
  - Cardinality (knowing how many you counted)

- Supports learning arithmetic
  - Even after accounting for IQ and language

Part 2 of the Learning Trajectory

1. Goal

2. **Developmental Progression**

3. Educational Activities

Young Children and Number

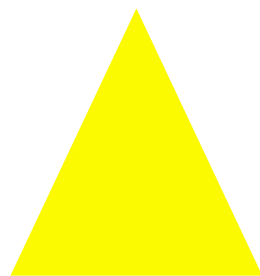- Infant competencies
- "Habituation" research
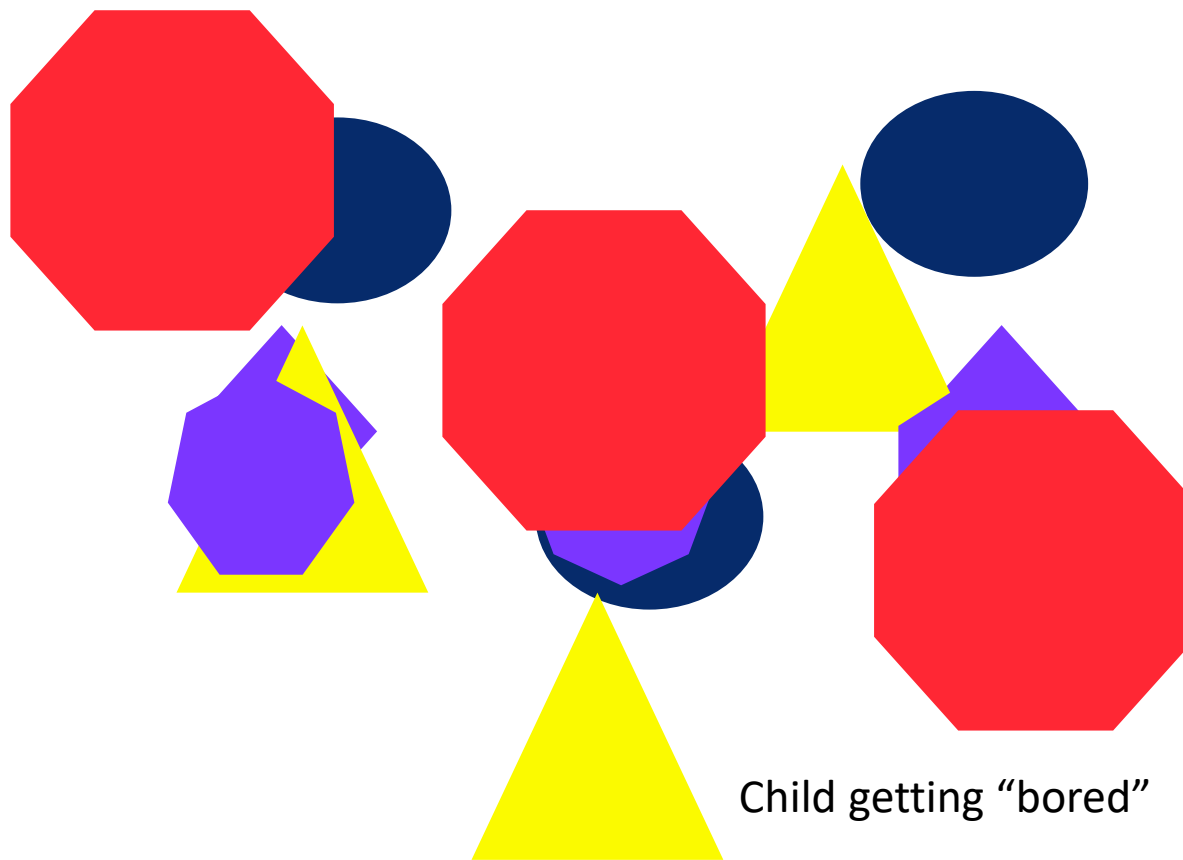
Child getting "bored"
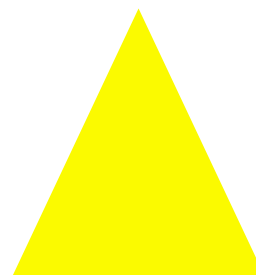
Perceptual Subitizing

- ## What is it?
  - The ability to "just see" how many objects in a small collection.

- ## Let's actually do some perceptual subitizing.
  - Ready?

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What did you see?

Conceptual Subitizing

- ## What is it?
  - The ability to see the parts of multiple small sets and putting together the whole.

- ## Now, let's try some conceptual subitizing.
  - Ready?

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What did you see?

What Did You See?

- How did you know?
- Think-pair-share!

LT Level: Foundations

• Within the first year, sensitive (dehabituates) to number, but does not have explicit knowledge of number. For infants, this begins with very small numbers (1 or 2).
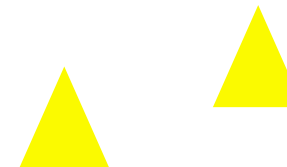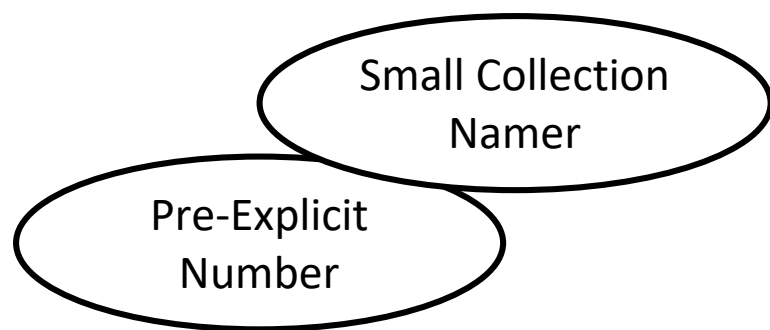
Foundations

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LT Level: Small Collection Namer

- Names groups of 1 to 2, sometimes 3.

"Two doggies!"

Small Collection Namer

Pre-Explicit Number
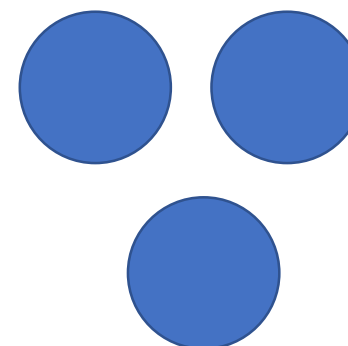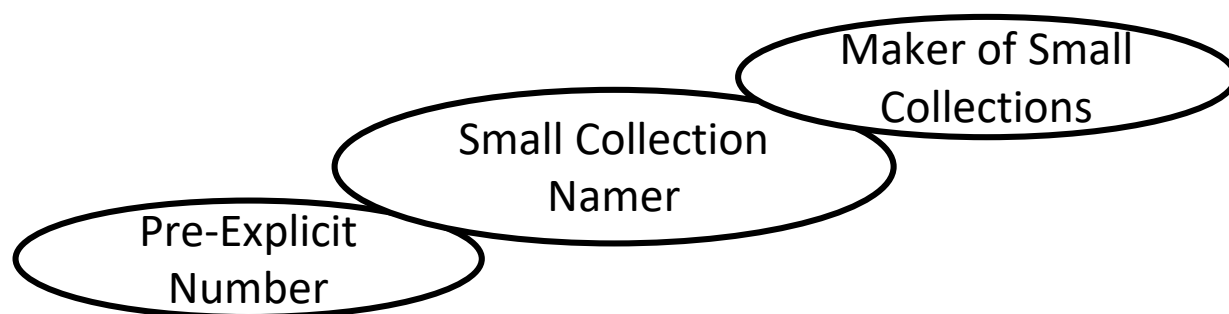
LT Level: Maker of Small Collections

- Makes a small collection (no more than 4, usually 1–3) with the same number as another collection or from the number word.

Maker of Small Collections

Small Collection Namer

Pre-Explicit Number

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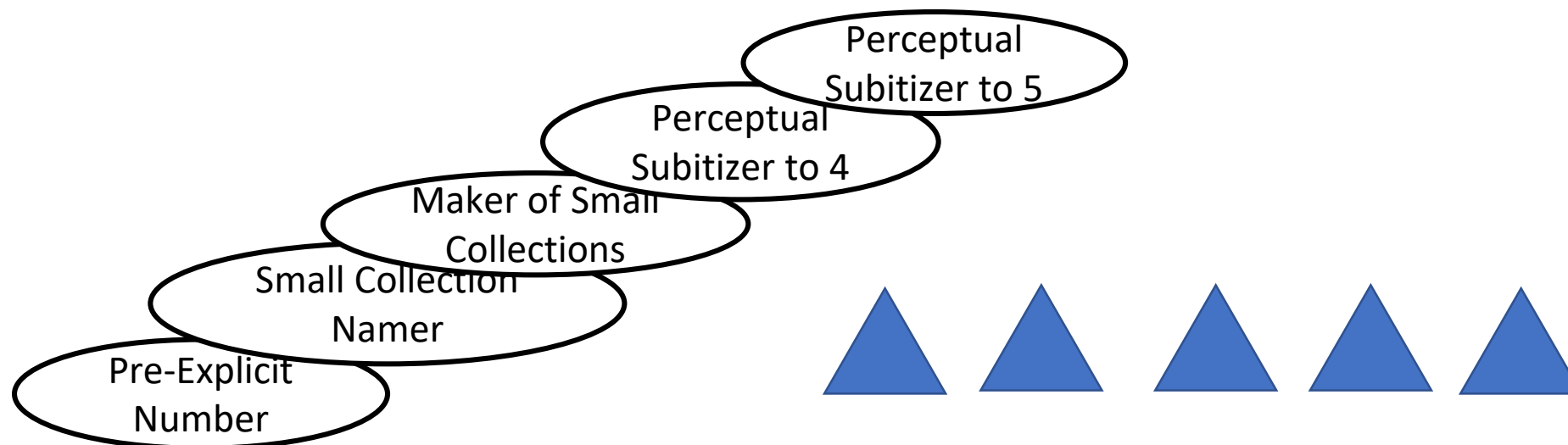
LT Level: Perceptual Subitizer to 4

- *Quickly* recognizes collections up to 4 briefly shown and names the number.
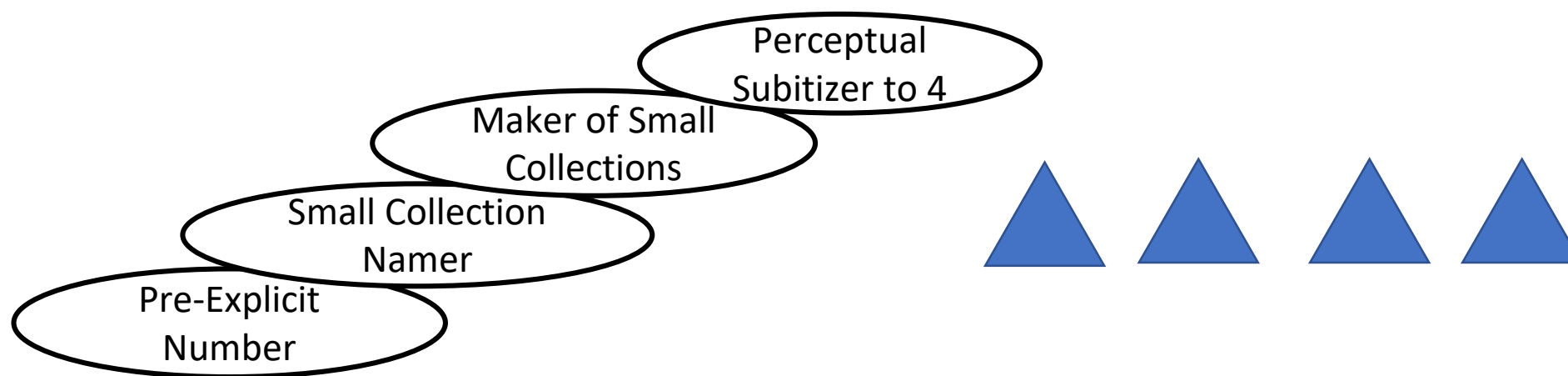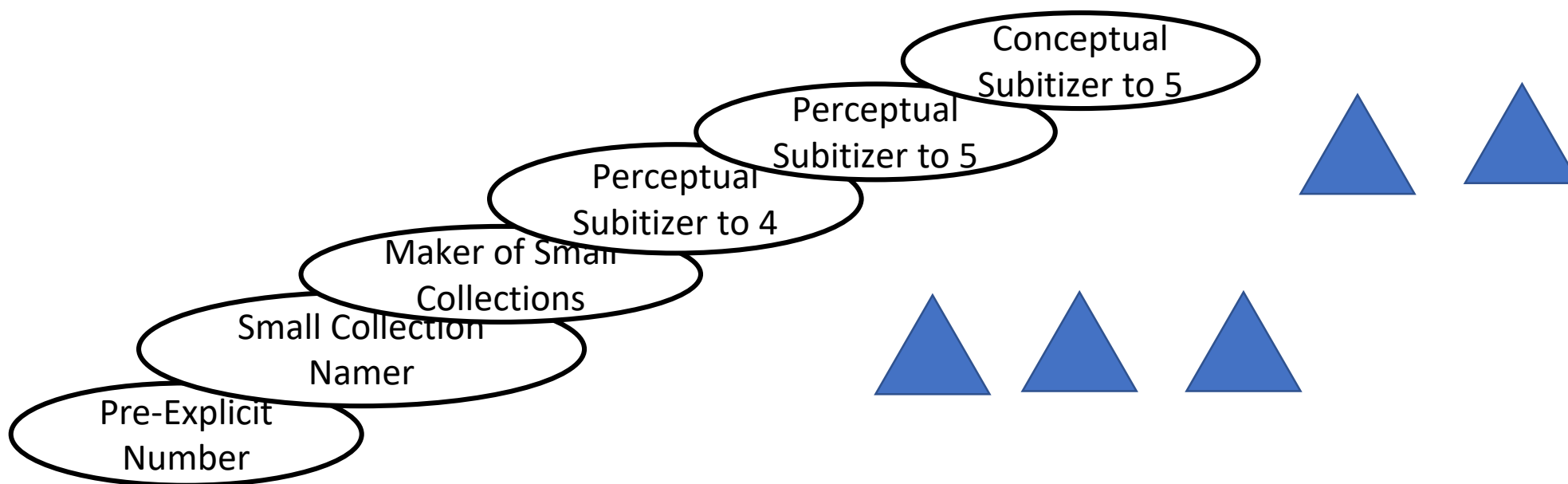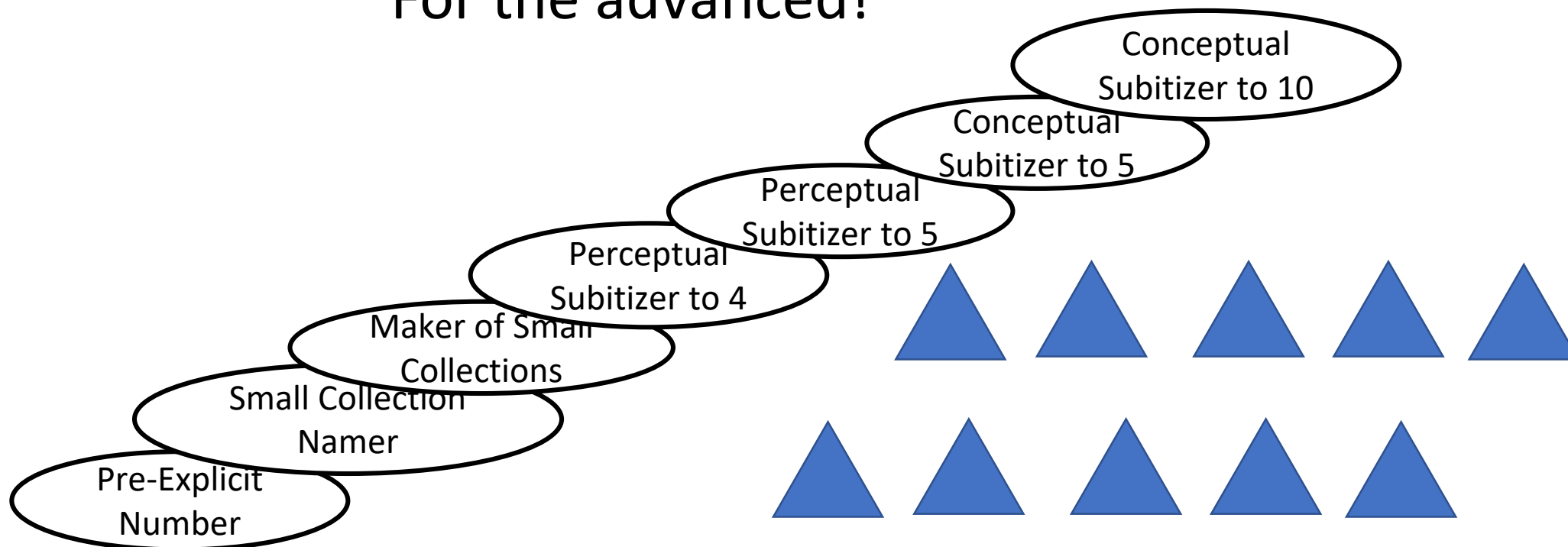
LT Level: Perceptual Subitizer to 5

- *Quickly* recognizes collections up to 5 briefly shown and names the number.

Perceptual Subitizer to 5

Perceptual Subitizer to 4

Maker of Small Collections

Small Collection Namer

Pre-Explicit Number

LT Level: Conceptual Subitizer to 5

- Names the total in all arrangements to about 5, when shown only briefly.

Conceptual Subitizer to 5

Perceptual Subitizer to 5

Perceptual Subitizer to 4

Maker of Small Collections

Small Collection Namer

Pre-Explicit Number

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LT Level: Conceptual Subitizer to 10

- Extends to 10.
  For the advanced!

Part 3 of the Learning Trajectory

1. Goal

2. Developmental Progression

3. **Educational Activities**

Math Language

- When children make a math utterance, teachers:
  - 60% of the time ignore it
  - only 10% of the time respond mathematically

This has important implications for children, particularly dual language learners.

What To Do to Help Children Learn Subitizing

- Simple but continuous teaching strategy
  - Use small numbers in everyday talk and cultural storytelling
- You can make a huge difference
  - planned curricular experiences
  - spontaneous experiences

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Support Subitizing for Children who are Dual Language Learners

1. Choose culturally meaningful and familiar materials

2. Connect math terms to child's home language
   - Can the child can subitize in home or Tribal language?
   - Embed the child's language in the activity.

3. Multiple representations

4. Emerging competence versus struggles with expressive vocabulary

5. Tiered levels of questions

What To Do?

Quick Images or Snapshots

- Show a set for 2 seconds or less, then hide it

- Ask children to say how many they saw

How would you need to alter these cards to play this game?

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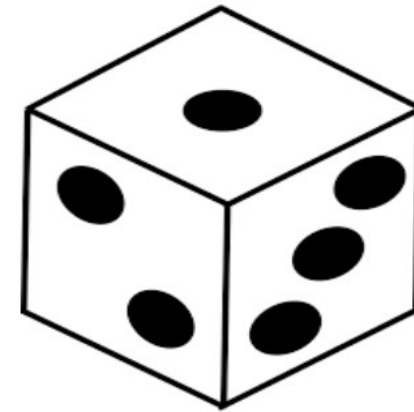
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Rhythmic Subitizing

Subitizing can also be rhythmic.

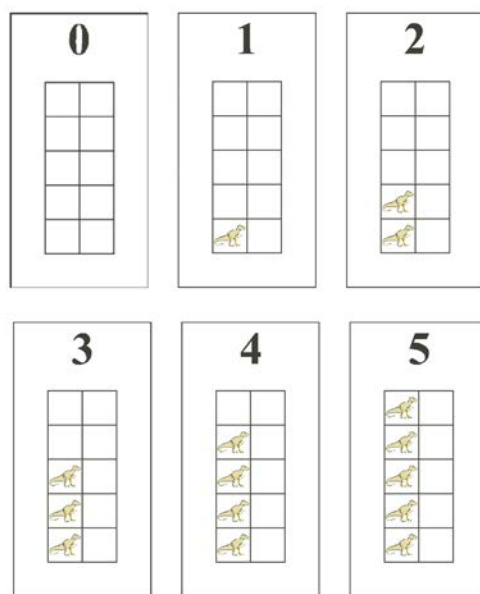# Supporting Children with Suspected Delays or Identified Disabilities

- Subitizing is *especially* important for children with special needs.

- *Follow the learning trajectory with patience!*

- Use number names *all day,* naturally but intentionally.

- Play a lot of dice and domino games.

Supporting Children with Suspected Delays or Identified Disabilities

- Work toward use of fives and tens frames, a powerful representation (Flexer, 1989).

- For those with perceptual issues, such as visual impairment:
  - use manipulatives
  - include lots of rhythmic subitizing

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Subitizing

"Subitizing is a fundamental skill in the development of [children's] understanding of number."

(Baroody, 1987)

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